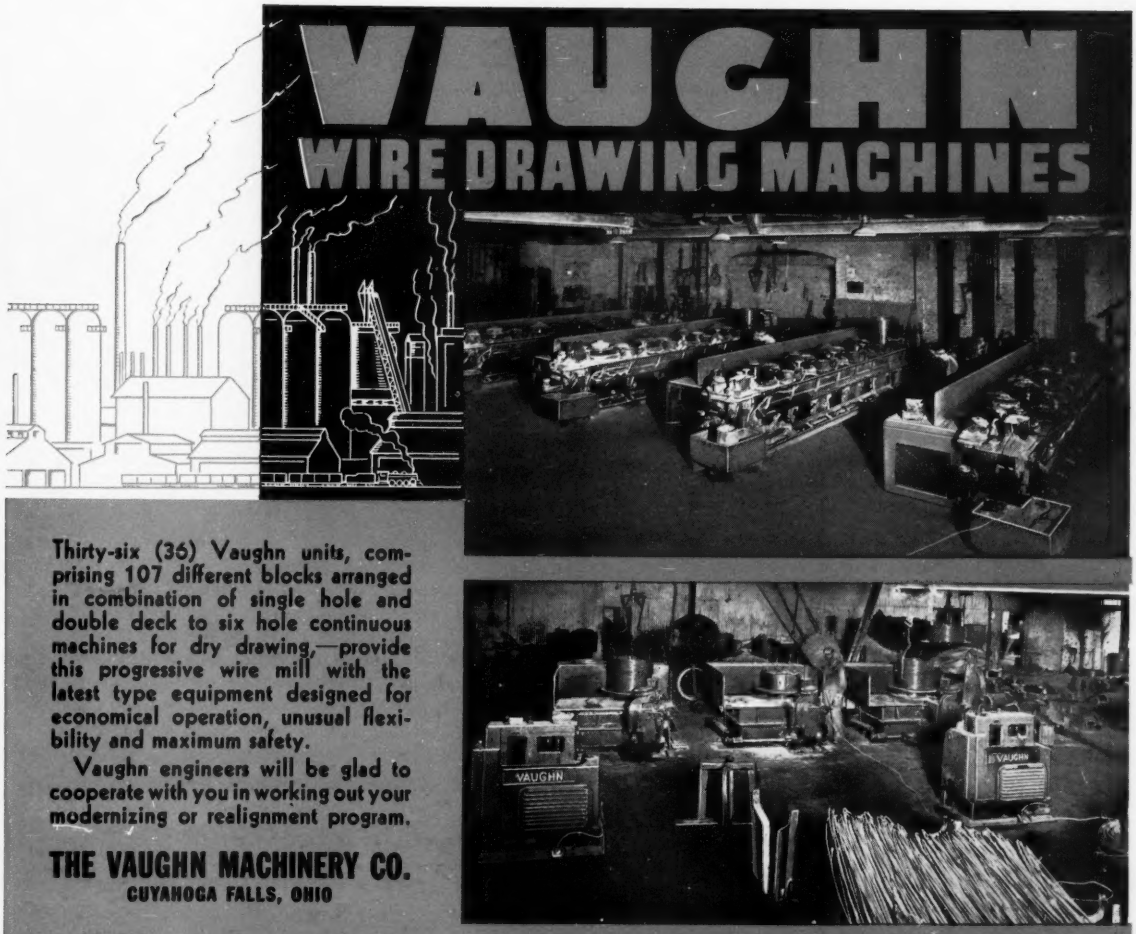
WIRE AND WIRE PRODUCTS

MARCH 1938

PITTSBURGH STEEL CO.'S MODERNIZATION PROGRAM *included*



Thirty-six (36) Vaughn units, comprising 107 different blocks arranged in combination of single hole and double deck to six hole continuous machines for dry drawing,—provide this progressive wire mill with the latest type equipment designed for economical operation, unusual flexibility and maximum safety.

Vaughn engineers will be glad to cooperate with you in working out your modernizing or realignment program.

THE VAUGHN MACHINERY CO.
CUYAHOGA FALLS, OHIO

COMPLETE WIRE DRAWING EQUIPMENT . . . CONTINUOUS OR SINGLE HOLE . . . FOR THE LARGEST BARS . . . FOR THE SMALLEST WIRE . . . FERROUS, NON-FERROUS MATERIALS OR THEIR ALLOYS

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

YOUNGSTOWN'S
High Carbon Spring Wire is "Dead Cast" . . . Forms Faster, Serves Longer . . .

★To you production executives, on the alert to improve your product, the dead cast of Youngstown's High Carbon Spring Wire is definite proof that residual strains have been eliminated after drawing.

Forming machines, operating on Youngstown Wire, show better production with less rejects because power is devoted solely to forming and not to bucking residuals.

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Let us study your spring wire operations and submit adequate samples to prove the easy forming characteristics and fatigue resistance of Youngstown's High Carbon Spring Wire.

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Manufacturers of
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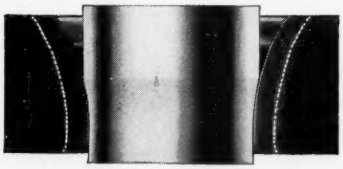

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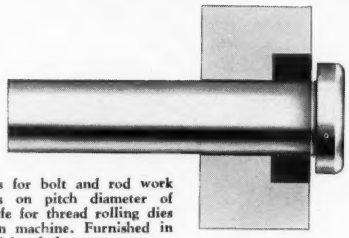

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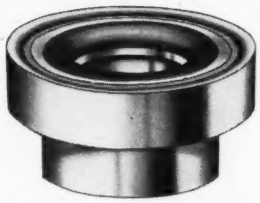
SECTIONAL DIES

★ Carboloy sectional dies—available in practically any shape—finish the material within close limits and frequently eliminate grinding and polishing operations.



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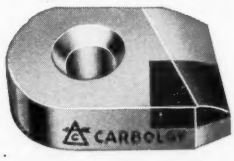

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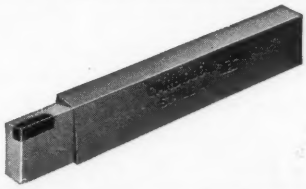

★ For machining all types of materials. Long tool life, low cost, and increased production.

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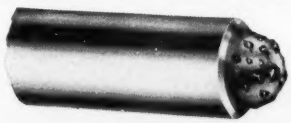

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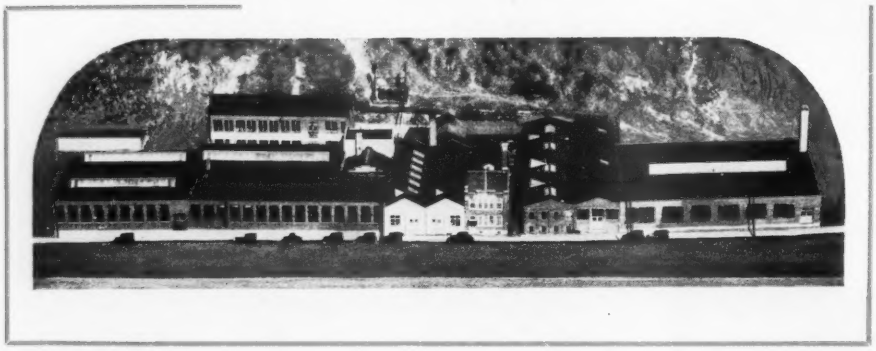

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A Luncheon will be served at the Monessen Plant
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Committee in Charge

J. E. Timberlake,
Jones & Laughlin Steel Co.,
Pittsburgh, Pa.

J. K. Beeson,
Pittsburgh Steel Co.,
Monessen, Pa.

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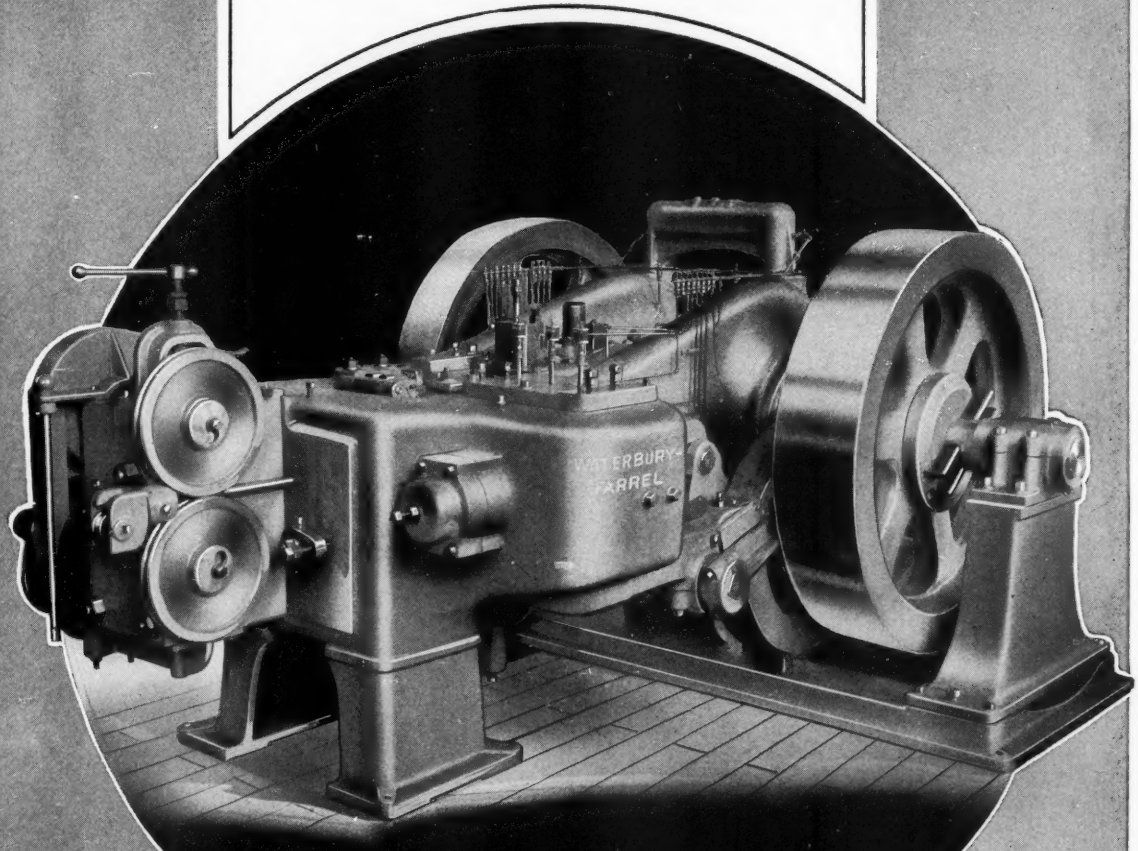

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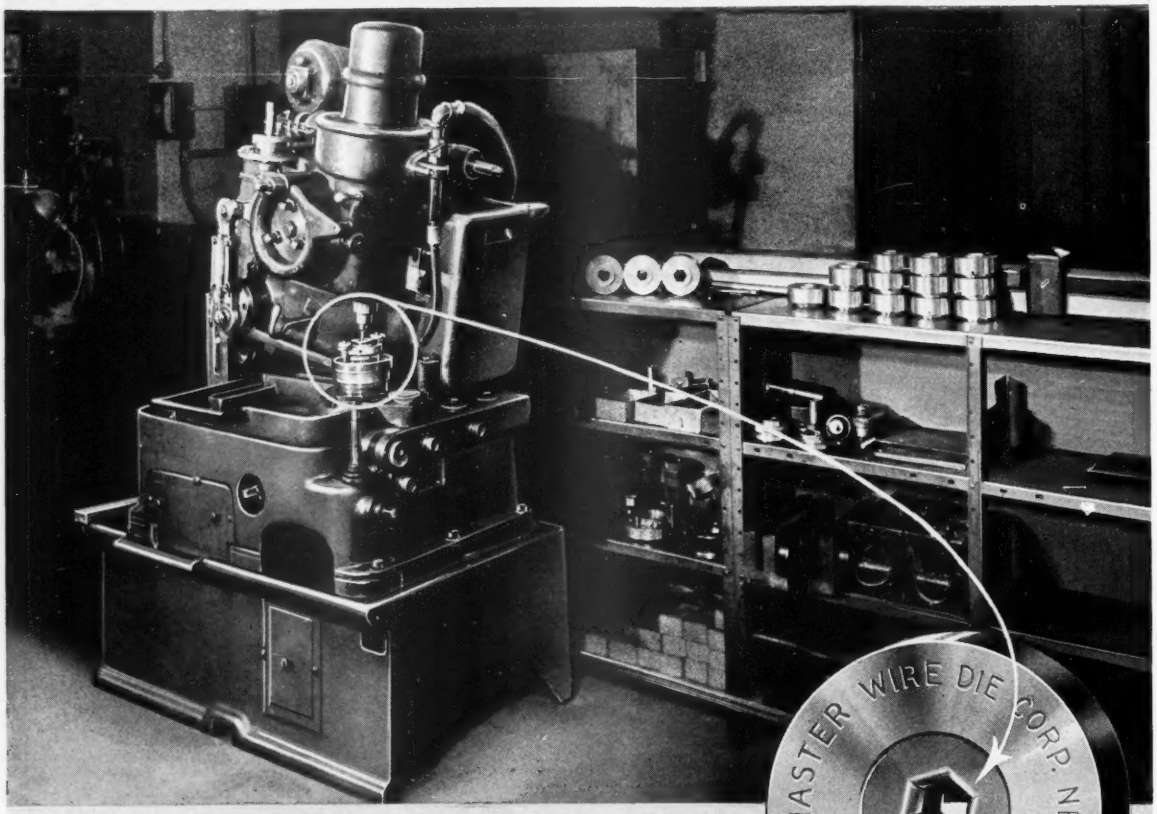

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Ordinary methods are not good enough for us in the production of our carbide dies. In order to serve our customers more efficiently, we have had to design and build our own machines to cut the costs for the wire mill.

Our superior equipment enables us to sell our carbide dies just one step from finishing, at so low a price that the wire mill die room costs are slashed.

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WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable

DRAWING—ROLLING—EXTRUDING—FORMING—FABRICATING

Vol. 13 MARCH, 1938 No. 3

Designated as

Official Publication By The Wire Association

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WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip.
Wire Products and Insulated Wire and Cable.
DRAWING --- ROLLING--- EXTRUDING --- FORMING --- FABRICATING

Vol. 13 MARCH, 1938 No. 3

From Ore To Wire At A Glance

By William A. Seburn,
Superintendent Wire Mills,
Pittsburgh Steel Company, Monessen, Pa.

and

Daniel Neuman,
Asst. Superintendent Wire Mills,
Pittsburgh Steel Company, Monessen, Pa.

A concise description of the modernized plant of the Pittsburgh Steel Company and the principal processes used in wire production operations. ✦ ✦ Members of the Wire Association and their guests are invited to inspect this plant in connection with the Wire Association Regional Meeting to be held at Pittsburgh, April 1, 1938.

THE visitor to the Monessen Works of Pittsburgh Steel Company has the unique opportunity during a single brief visit of seeing the complete manufacture of steel through every process from the charging of iron ore, coke, limestone and other materials into the blast furnace to the finished product. One can see low carbon wire drawn into all sizes from heavy cold heading diameters to those fine sizes comparable with common thread wire, annealed spring quality wire in all sizes, or softened by four different methods: (1) Molten salt, (2) Pot Annealed, (3) Furnace Annealed, and (4) Lead Annealed, depending upon the physical requirements of the finished product. Nails of all varieties including common nails, special brads, twin head, and even heat treated nails for driving into concrete and through light steel plate can be seen falling from machines which operate so fast that the eye can hardly follow the operation of the machine itself.

BARBED Wire is twisted by the mile on fast machines from shining bright galvanized wire. Highway guard and concrete reinforcing mesh, which as their names imply, constitute an integral part of highway and building construction are formed and welded on a multitude of machines rugged in construction each doing its part to add to the safety of travel by automobile as well as building construction. Wire rightfully claims the distinction of being the most highly finished form of steel. Long before a coil of wire is recognizable as such considerable equipment, many operations and various elementary materials transform these materials progressively into forms that lead to the desired goal.

✦ ✦ ✦

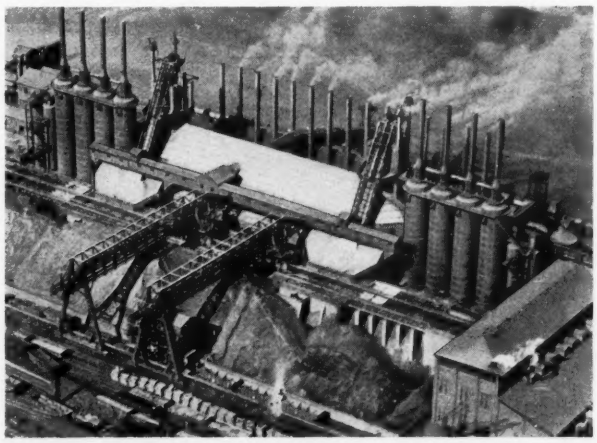


Fig. 1. Blast Furnaces—Monessen Works. ✦ ✦ ✦

Blast Furnaces

FROM the adjoining bin and ore yard, correctly measured quantities of iron ore, limestone and coke are charged into the top of the huge blast furnaces. From the bottom of each of these furnaces may be drawn 700 tons of molten iron per day. Between these two

Designated as Official Publication by the Wire Association

points, the top and the bottom of the blast furnaces, the proper equipment, control and "knowing how", with predetermined accuracy, produces the first product transformation.

✦ ✦ ✦

Open Hearth Furnaces

WITH the proper amount of limestone base in the open hearth furnace, the correct amount of selected scrap iron is melted down, the pig iron is added and the entire charge worked down by means of intense heat and by oxidation to the approximate desired analysis. Certain elements such as copper, ferro-manganese and ferro-titanium may be added in the furnace and when the heat of steel is "teemed" or poured into the large ladle capable of holding the entire charge of some 125 tons, other ingredients such as ferro-silicon, ferro-phosphorus, etc., may be added in the ladle to obtain the specific analysis demanded by the individual customer's specifications.

✦ ✦ ✦

BEHIND this spectacular pyrotechnical display of the white-hot metal pouring into the huge ladle, are intricate controls, scientific analyses and much of what can best be described as the "knowing how" of the experienced steel maker. Even the exact length of time—only a few minutes—that the steel rests in the ladles to come to the proper equilibrium before being poured into the ingot molds is a matter of important steel-making knowledge. Each heat of steel is given an identification number which it bears throughout all the succeeding operations.

Fig. 2. Open Hearth Furnaces. There are 12 furnaces in this 1200 foot building.

✦ ✦ ✦ ✦ ✦ ✦

✦ ✦ ✦

Bloom, Billet and Bar Mills

WHEN the hot steel is cooled enough that the outer surface is solidified, the ingots are stripped from the molds and taken to the soaking pits where they are brought up to a uniform predetermined temperature sufficient to insure good rolling conditions in the rolling mills.

IN the Blooming Mill the ingot may be reduced to sections ranging from 12″x12″ to 6″x6″. When smaller sections are desired, the blooms travel down to the billet mill to be reduced to sections measuring down to 4″x4″. Should still smaller sections be demanded, the 4″x4″ sections go into the small billet mill to be reduced into $1\frac{13}{16}$″ x $1\frac{13}{16}$″, $1\frac{3}{4}$″ x $1\frac{3}{4}$″, $1\frac{1}{2}$″ x $1\frac{1}{2}$″ Billets, up to 3″ x 3″ squares, also slabs measuring 7″x3″ to 5″x3″ are made. Round Sections from $2\frac{3}{4}$″ to 6″ can be made.

✦ ✦ ✦

Rod Mills

PITTSBURGH Steel Company has two distinct types of rod mills for conversion of billets to rods. The visitor to Monessen will note a vast difference between these mills and will marvel at the dexterity of men handling white-hot snake-like rods traveling at enormous speeds.

✦ ✦ ✦

THE Morgan mill is a continuous sixteen stand mill rolling two strands of rods with little handling. Its stock is a $1\frac{3}{4}$″x$1\frac{3}{4}$″x30′ Billet. Its product is a No. 5 gauge to $\frac{1}{2}$″ rod ultimately, coiled on high speed coilers and automatically delivered to trucks.

Fig. 3. Casting iron pigs. The streams of metal to the right are flowing from the ladle.

✦ ✦ ✦ ✦ ✦

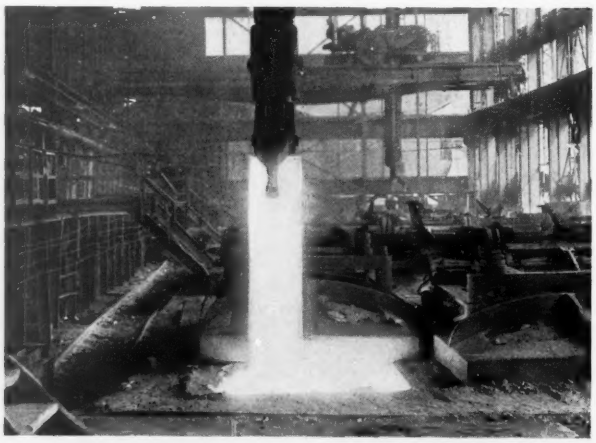


Fig. 4. Ingot leaving soaking pits for the blooming mill. Ingots are "soaked" in heat of about 2000°F. untill they reach uniform temperature for rolling.

✦ ✦ ✦ ✦ ✦ ✦

THE Garrett Mill consists of several continuous stands and eleven looping stands. This is a very spectacular mill for the visitor to watch inasmuch as the major portion of rolling is dependent upon human skill. The entering stock is a 4"x4" Billet and the resulting products rods from No. 5 gauge to 7/8". Two sets of coilers and two automatic conveyors serve this mill.

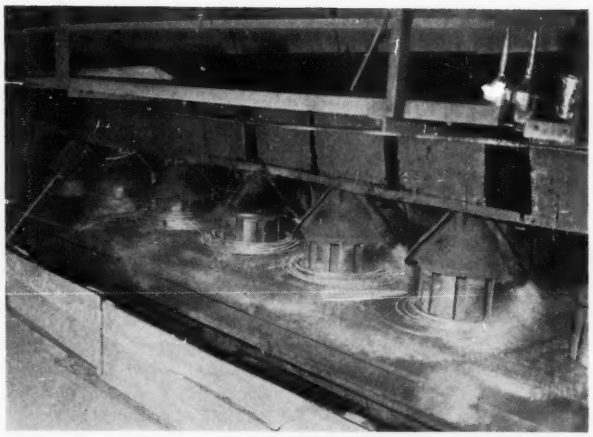


Fig. 5. Coiling hot rods at No. 1. Rod Mill.

ACCURATE frequent checks are made of the temperature, iron concentration and acidity of each pickling vat as well as the temperature and lime concentration of the lime vats, thus insuring positive control of conditions at all times.

✦ ✦ ✦

THE Wire Mills are equipped with the latest types of modern wire drawing equipment. Flash Welders and Butt Welders make it feasible to employ the continuous wire drawing equipment approaching maximum efficiency by making it possible to weld the rods insuring a continuous one piece of entering material to the machines.

✦ ✦ ✦

WIRE is serving a multitude of purposes and consequently a great number of special finishes have been developed to satisfy each customer's requirements. At present the commonly desired finishes are produced by means of various lubricants such as: Soap for Spring Wire, Lime and Grease for ordinary stock, such as nails, Galvanize stock, and special lubricants for cold heading and welding electrode wire, special bright wire, including flux coated welding wire, welded mesh, welded reinforcement and forming wire.

✦ ✦ ✦

Wire Mills

BEFORE cold drawing the rods through suitable dies to produce wire, it is necessary to remove all of the scale from the surface of the rods. This is accomplished by allowing a stem of rods, (8 Bundles or 2400#) to be suspended in a weak solution, (6% to 8%) of sulfuric acid maintained at a temperature of 120 to 180 Fahrenheit depending entirely upon the analysis of the steel being cleaned. High carbon steels are cleaned at the low temperatures while the low carbon steels are cleaned at the higher temperatures. The length of time also varies, depending upon the steel involved, from 40 to 60 minutes. Further control of the cleaning is obtained by the use of inhibitors, which in addition protect the health of employees and add to their comfort.

HAVING removed the scale, the rods are thoroughly washed by means of two parallel high pressure sprays playing on two sides of the rods while the stem is slowly raised and lowered between them. The rods are then (1) immersed in special lime when a bright finished wire is desired, or, (2) placed on a sull rack exposed to atomized water for a given length of time ranging from 5 minutes to 60 minutes, depending upon the degree of sulling desired and then immersed in the lime solution. After either operation, the rods are placed in bakers maintained between 350 to 400 Fahrenheit. This heating hastens the drying of the lime on the rods and thus prevents the rods from rusting. Also, any slight trace of hydrogen absorption is removed by the heat.

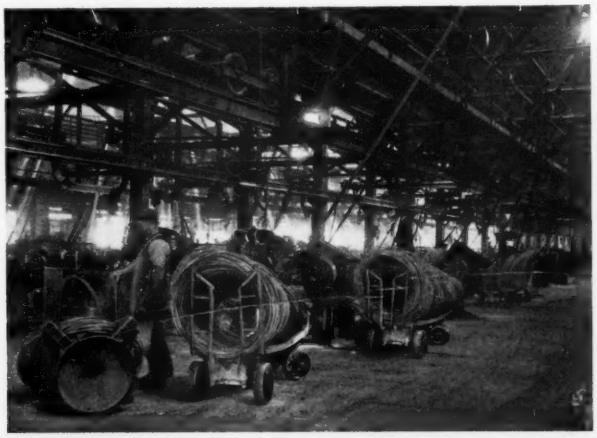


Fig. 6. Wire drawing department. There are 370 drawing blocks with a range of 3/4" to No. 34 gauge in this mill.

Fig. 7. One of several multiple-block continuous wire drawing machines.

UNIFORM size from one end of bundle to the other, together with uniformity from bundle to bundle of a size in a shipment is made possible by means of tungsten carbide dies. A die shop, fully equipped with the necessary equipment capable of performing all the operations on a die from rough drilling to final polishing, is maintained well stocked with dies.

✦ ✦ ✦

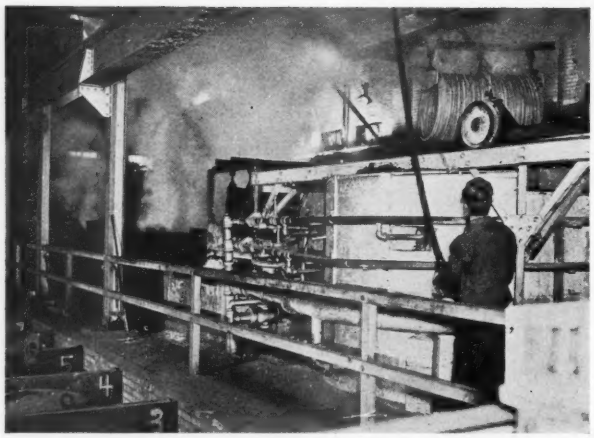


Fig. 8. Lavite annealing furnaces and cleaners. ✦ ✦

THE Stainless Steel Wire Division of the Mill is fully equipped with the necessary special equipment needed for the production of all types of stainless wire whether it be for forming, welding or cold heading.

✦ ✦ ✦

Annealing and Patenting

MOLTEN salt annealing as performed under exacting control at the Pittsburgh Steel Company, produces a clean, scale free, uniform low tensile product, that serves admirably for special processed wire where extreme uniformity is highly essential. Because of its cleanliness and ductility, it works very well, for instance, as box binding wire. A specially prepared anti-rust coating is applied to this wire for protection against discoloration and rusting.

✦ ✦ ✦

THE Pot Annealing Department is fully equipped to produce pot annealed low or high carbon wire for a variety of purposes, normalizing or spheroidized S.A.E. 1035 steel for cold heading, and spheroidized high carbon stock for severe forming prior to heat treatment.

✦ ✦ ✦

PATENTING equipment for heat treatment of high carbon steel rods and wire is essential in the manufacture of quality spring wire. Exacting automatic controls connected with recording instruments make it possible to duplicate established satisfactory practices.

✦ ✦ ✦

Galvanizing

ALL types of hot-galvanizing wire finished such as charcoal wiped; lever or air cooled, screw wiped or water cooled, and bobbin wiped are produced. Each type, of course, serving a very useful purpose for each particular or individual fabricating job.

✦ ✦ ✦

Fence, Fabric and Road Guard

A LARGE variety of lawn, farm and industrial chain link fence too numerous to mention in this brief outline are manufactured. Two general types of fence are produced, namely, (1) the electric welded and (2) the hinged joint type.

Fig. 9. Pot annealing wire forestalls oxidation. ✦ ✦

THE Fabric Department houses the manufacturing facilities of three important fabricated products. First, Steeltex, a welded wire fabric Mesh with a specially treated paper attached to one side, employed as a plaster base in building and office construction; Second, various styles of welded wire reinforcement mats for use in road construction and revetment building; Third, woven high tensile spring wire road guard.

✦ ✦ ✦

Specification, Order and Schedule Department

IN order that all customers may be served to the best advantage with respect to the specifications, proper scheduling of each order and making deliveries, as requested, all orders are routed through the Specification, Order and Schedule Department. Each customer's specifications are established and maintained up-to-date. Through the able assistance and cooperation of the Research, Metallurgical and development, and Sales Departments new specifications, and revision of old specifications for the betterment of all concerned is constantly taking place in an attempt to keep up with modern trends and modern fabricating equipment. Each order is dealt with separately as an individual unit and each department involved is scheduled by means of detailed specification sheets to do its part in logical sequences to facilitate prompt and accurate fulfillment of the customer's desires.

✦ ✦ ✦

Seamless Tube Division

THE Seamless Tube Division of the Pittsburgh Steel Company is located at Allenport, a few miles from Monessen. Rotary Drill Pipe, Casing,

Oil Well Tubing, Boiler tubing as well as many types of special equipment tubing are manufactured there.

✦ ✦ ✦

OF course there are a multitude of technical details, materials, processes, inspection operations, electrical and chemical analysis, physical tests, etc., involved in the manufacture of a strand of wire from the pile of iron ore and no attempt has been made to touch upon these.

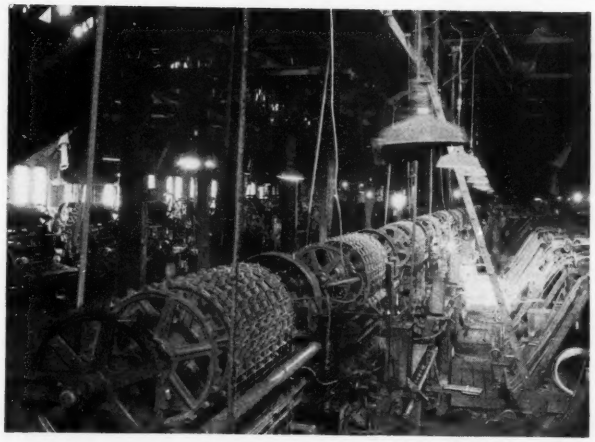


Fig. 10. A line of fence machines. ✦ ✦ ✦

✦ ✦ ✦

THOSE who have an opportunity to visit the mill during the Regional Meeting of the Wire Association will be escorted by technical men who will be able to answer questions, and at any time, members of the Wire Association or others interested in wire, have an opportunity to get to Pittsburgh, they are more than welcome to visit nearby Monessen, Pennsylvania Plant and see the complete manufacture of steel from ore to wire, if not at one glance, at a few glances that can be crammed into a single trip of a few hours' duration.

✦ ✦ ✦

Wire Stems For Real Flowers

By Bob McLean,
Oakland, California

FIVE tons of fine wire are used every year between July 1st and October 1st, to make stems for 20,000,000 fresh cut, natural flowers, at a large nursery in California.

✦ ✦ ✦

THIS seeming paradox is accounted for by the fact that the blooms are "everlasting flowers," dry, straw-like blossoms of brilliant hue which last for many years. Their natural stems become so brittle after the flowers are picked however, that they break easily and will not stand shipping.

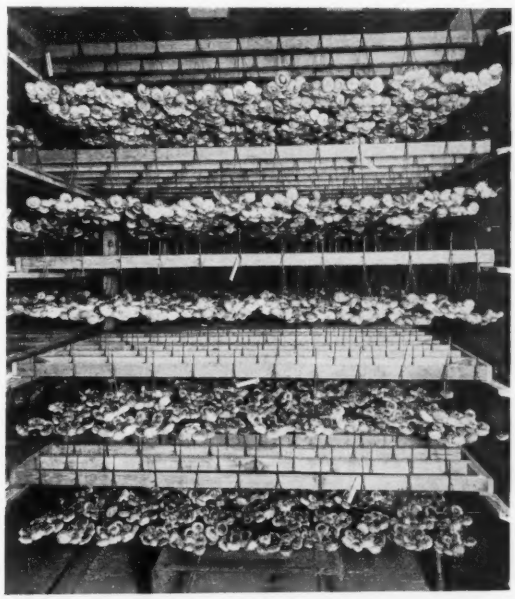
✦ ✦ ✦

CONTRARY to popular belief, "everlasting flowers" are not artificial but grow naturally, their botanical name being helichrysum. They are artificial only in the sense that they are dried to preserve texture and color. In an almost inaccessible spot on the California coast near the little town of Montara, some 70 acres are devoted to this odd industry, the principal grower being the A. R. Wagner Nursery.

✦ ✦ ✦

CUT without stems, the fresh blossoms are attached to the wires by the supple fingers of girls, at the rate of 6000 a day. They are then assembled in bunches of 25 and hung upside-down in electric dehydration chambers where they remain from 36 to 38 hours at temperatures ranging from 130 to 200 degrees. After dehydration the flowers are packed in fibre-board boxes and shipped to all parts of the United States. A brilliant combination of red, yellow, blue and white, the bouquets may be seen in hospitals, institutions and private homes.

View of the A. R. Wagner Nursery in Montara, California, from which 20,000,000 wire-stemmed "everlasting flowers" are shipped annually to all parts of the United States. ✦ ✦ ✦ ✦



Wire-stemmed "everlasting flowers" hanging in one of the electric dehydrating units at the A. R. Wagner Nursery in Montara, California. ✦ ✦ ✦ ✦

Non-Ferrous Annealing In Controlled Atmospheres

By W. F. Ross,
Furnace Engineer, The Electric Furnace Co.,
Salem, Ohio.

Some Recent Developments in Continuous, Controlled Atmosphere Furnace Equipment for Bright Annealing Non-ferrous Wire, Tubing, Strip, etc. ✦ ✦

THE necessity of producing bright, smoothly finished material of definite physical characteristics has lead to the universal acceptance of controlled atmosphere annealing furnace equipment throughout the non-ferrous industry. This is particularly true in the field manufacturing small gauge copper, brass, bronze and nickel-silver wire and thin strip stock, although there are many applications in which heavier materials, such as tubing, extruded shapes and straight or coiled bar stock are beneficially annealed in controlled atmosphere furnace equipment.

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COMPARISON of material annealed within a controlled atmosphere will show greatly improved condition of surface both as to finished appearance and smoothness over material annealed at the same time and temperature in ordinary furnace equipment with its necessary second step of pickling and cleaning. The production of work to be annealed for further breakdown is accomplished with complete elimination of the scale that is ordinarily a detrimental factor in die maintenance as well as in the finished appearance of stock.

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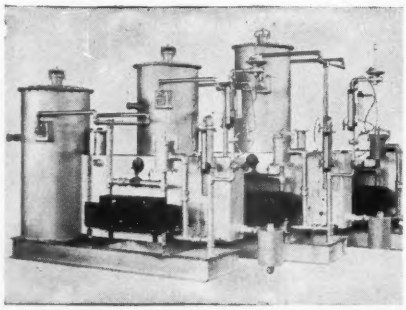
CLEAN scale free annealing is possible with practically all of the various alloys of copper with tin and zinc. Such materials as the heavy brasses and nickel-silver show a characteristic deposit of metal sweat at the higher annealing temperatures, which is proportionately decreased with the decrease in treating temperature, and which is, in any case, easily removed in a flash pickle with no noticeable etching action.

✦ ✦ ✦

THE fact that work can be retained under heat for longer periods of time than would be possible in furnace equipment in which scaling or oxidizing action could take place on the surface of the metal, allows complete freedom in regulating the physical characteristics of the finished product. Work annealed in special atmosphere furnaces and held within limits of 2 points in hardness is the common rather than the extraordinary practice.

✦ ✦ ✦

THE ability to leave material within the heating chamber for an unlimited time makes possible the use of lower temperatures to produce physical characteristics ordinarily obtained at temperatures from 100 to 350° higher. The increased time within the heating chamber necessitated by an anneal at a relatively lower temperature allows uniformity of anneal throughout not only the cross section of material on the hearth, but also the individual section of each type of material.



Photograph A. Three sizes of Elfurno gas generators for producing protective atmospheres used in controlled atmosphere furnaces for bright annealing ferrous and non-ferrous products and for copper brazing, scale-free heat treating, etc. ✦

✦ ✦ ✦

The Controlled Atmosphere

THE controlled atmosphere is broadly, a combination of inert gases from which those elements detrimental to surface of the material being annealed are either eliminated or held in combination in a harmless form.

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SUCH an atmosphere may be made from dissociated ammonia in which nitrogen plays the part of the inert gas while the hydrogen is beneficially used as a reducing agent. This type of atmosphere is, therefore, known as reducing. Another and more common example of atmosphere is the cleaned and dehydrated gas formed by the products of combustion of natural or manufactured gas with air in which the percentages of CO or CO_2 are controlled within narrow limits to produce either an oxidizing or a reducing atmosphere. As the reaction either way tends toward perfect combustion, a neutral atmosphere is obtained. Generators for producing these special protective atmospheres economically are made in various types and sizes with capacities ranging from a few thousand cubic feet per hour for comparatively small furnaces up to large capacity installations in single units or batteries. Three sizes of Elfurno gas generators are shown in the accompanying photograph A.

THE necessity of producing a controllable atmosphere in regions where combustible gas is not accessible has lead to the recent development of atmospheres produced from the combustion of coal oil, coal, charcoal and other materials of high carbon and hydrogen content.

✦ ✦ ✦

SULPHUR as an element in the composition of the fuel used for producing the atmosphere, requires special treatment, since the non-ferrous metals and annealing temperatures are particularly susceptible to its action. The presence of sulphur in the atmosphere at higher temperatures results in a sulphide skin upon the material which is not easily removed by pickling. This elimination is accomplished in one of several ways, the simplest method of which is the removal of hydrogen sulphide and sulphur dioxide from the products of combustion in scrubbing towers of simple design.

✦ ✦ ✦

SINCE water vapor is susceptible to dissociation in the presence of carbon at high temperatures, it is necessary to remove the water formed in the atmosphere by the products of combustion. This removal is further necessitated in order to insure elimination of vapor which might otherwise condense within the cooling hood and drop upon the work thus causing water spots or stains. This is accomplished through suitable traps and by rapidly cooling the atmosphere to a point well below that of condensation before introducing the atmosphere to the annealing equipment.

✦ ✦ ✦

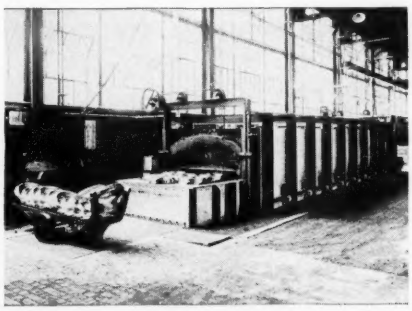
Controlled Atmosphere Furnace Equipment

ANY type of furnace in which a controlled atmosphere may be easily retained is adaptable to the production of clean work. The usual construction of such furnaces embodies a heating chamber contained in a welded steel shell, so fabricated as to be gas tight, and lined with suitable refractory material. Work can be produced clean in batch type furnaces by bringing the material to the required temperature in an atmosphere purged of all air and then cooled under this same atmosphere within the furnace. In continuous furnaces, however, such as the roller hearth type, the roller-rail pusher type, and others in which the work is steadily conveyed through the heating chamber in continuous production, it becomes necessary to add a cooling hood to the discharge end of the furnace, in which the moving work is cooled to a point below which oxidation may occur before discharge. Where a cooling hood is employed atmosphere is maintained in both the heating chamber and the cooling hood.

Photograph B. Shows the discharge end of a continuous controlled atmosphere furnace bright annealing copper tubing in coils. This furnace is equipped with The Electric Furnace Company's new recuperative type gas fired radiant tubes.

✦ ✦ ✦

THE necessity of sealing the furnace after purging and during the process of annealing under atmosphere, leads to the use of several ingenious designs for minimizing the loss of the furnace atmosphere at the charging and discharging ends of the equipment.



Photograph C. Continuous gas fired furnace clean annealing brass and bronze wire in coils. The coils are carried through the furnace continuously on a series of heat-resisting alloy chain conveyors spaced to carry both large and small coils. This furnace anneals 5000 lbs. of wire per hour. ✦ ✦ ✦ ✦

✦ ✦ ✦

THE electric cast resistance grid type of furnace is especially adaptable to the use of controlled atmosphere. The radiant tube type of furnace which approximates the electric furnace in many ways is also adaptable, since the products of combustion are confined within the radiant tubes themselves and so do not come in contact with the work passing through the furnace. Several furnaces of this type have recently been installed which are producing excellent results on non-ferrous products. One of the most recent installations is shown in Photo B This illustrates a continuous roller hearth type furnace for bright annealing copper tubing in coils. The material is conveyed through the furnace on trays which ride on continuously rotating rollers.

✦ ✦ ✦

THE radiant tubes used in this furnace are the new gas fired recuperative type radiant tubes developed by The Electric Furnace Company of Salem, Ohio. These tubes incorporate a new principal in radiant tube design. By the recuperative principle the otherwise wasted gases are used to preheat the incoming combustion air before entering the furnace chamber thus requiring less fuel and making this tube very economical to operate. By using the waste gases or products of combustion to preheat the incoming air practically all the heat is utilized and the products of combustion leave the furnace at very low temperature. Another advantage is gained by admitting the necessary combustion air throughout the entire length of the burning chamber thus providing positive mixture of air and gas just where it is needed for perfect combustion. This provides an even temperature over the entire length of the tube and makes it possible to maintain uniform temperature throughout the entire furnace chamber. These tubes are easy to adjust or to in-

stall, in fact a tube may be removed and replaced while the furnace is in operation.

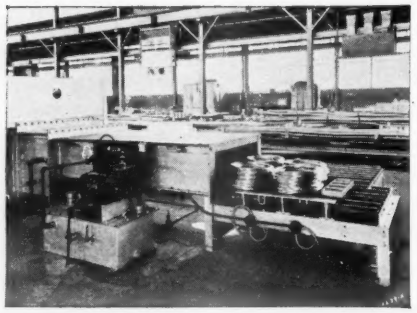
✦ ✦ ✦

EXCELLENT work has also been produced in gas fired furnaces in which the work passes through the heating chamber completely surrounded by a tunnel type muffle of alloy or other non-permeable material. Where clean but not bright work is required a gas fired furnace without the muffle is frequently employed with the products of combustion, from the burners themselves, forming a protective atmosphere. This type of furnace equipment necessitates a careful control of the proportion of air and gas delivered to the burners. Removal of sulphur and water vapor is, of course, not practical in this type of equipment and therefore its use is limited to installations for which sulphur free gas is available. A furnace of this type is shown in Photo C which illustrates a gas fired, continuous furnace for clean annealing brass wire in coils. Both large and small coils are handled in this equipment. The coils are conveyed to the equipment directly on traveling conveyors consisting of heat-resisting alloy chains.

✦ ✦ ✦

AN interesting example of the roller rail type of furnace is found in an installation made in a prominent eastern plant. This equipment consists of a heating chamber and a long water jacketed cooling hood with baffle type vestibules at the charge and discharge end, and is used for the

Photograph E. This view shows the complete installation from the discharge end of the furnace, including Elfurno gas generator, refrigerating unit, desulphurizing towers etc. Coiled strip is also handled in this equipment. ✦ ✦



Photograph D. Shows the charging end of a continuous roller hearth type controlled atmosphere electric furnace for bright annealing various sizes of bronze and copper wire in coils. The wire is loaded on trays and pushed through the furnace and discharged at the other end uniformly annealed, bright and dry. ✦ ✦

bright annealing of various shapes and sizes of bronze and phosphor-bronze wire, coils of which are loaded on alloy trays at the charging end of the equipment. The charging end of this furnace is shown in Photo D.

✦ ✦ ✦

AT the proper time interval, which is dependent upon the type of material being annealed, a loaded tray is slowly charged into the charging vestibule adjacent to the charging end of the furnace chamber. As the tray enters the vestibule it comes in continuous contact with baffles within the vestibule, thus minimizing the exfiltration of the atmosphere within the furnace. Since there are at all times three or more trays in progress through the vestibule, the charging entrance of the furnace chamber is adequately sealed and such atmosphere as does pass from the furnace chamber around the baffles provides an excellent purge for what air might otherwise pass into the furnace with the work.

✦ ✦ ✦

THE conveying system through the equipment consists of two roller rails extending the length of the heating chamber and the cooling chamber. The trays of material pass in a continuous line over these rails to the discharge end of the equipment where the tray runs out upon a roller top table from which the work is easily removed prior to the return of the tray to the charging end.

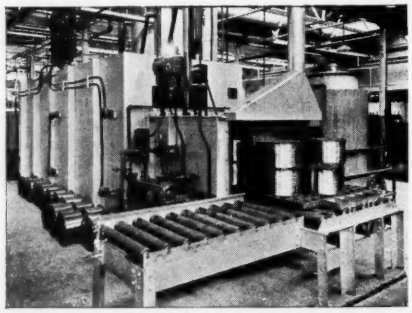
THIS equipment has produced excellent results in the annealing of bronze and phosphor-bronze, and continuously produces soft annealed brass and nickel-silver in a clean scale-free state of remarkably uniform physical composition. The equipment is used over a temperature range of from 700° to 1500°, and is powered at 135 Kw. through two Scott connected transformers. The protective atmosphere is produced in a combustion type generator consisting of a combustion chamber, pumping equipment, cooling coils and the necessary air-gas ratio metering equipment. Prior to introduction to the furnace, the atmosphere is lead successively through a water trap, three scrubbing towers for desulphurization, and a refrigerator for removing any remaining moisture from the atmosphere. An illustration of the complete furnace showing heating chamber, cooling chamber, Elfurno gas generator, refrigerator unit, scrubbing towers, etc. is shown in Photo E.

✦ ✦ ✦

A SIMILAR installation of furnace equipment for use with various sizes of coils of non-ferrous wire and for extremely fine wire wound on steel spools is producing excellent work in a prominent Detroit plant. An illustration of this furnace is shown in Photo F. This equipment is powered at 100 Kw. for use at annealing temperatures of 700° to 1000° F.

✦ ✦ ✦

TWO more special atmosphere installations for the bright annealing of miscellaneous light gauge non-ferrous wires wound

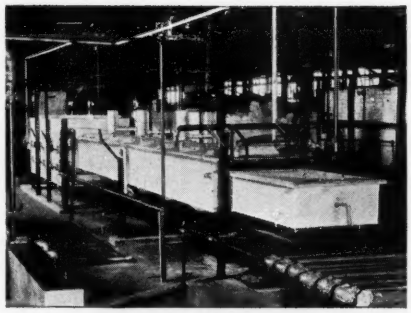


Photograph F. A 100 Kw., special atmosphere, pusher type electric furnace for bright annealing both heavy and fine copper wire on large reels on spools and in coils. ✦ ✦ ✦

on standard size spools have been installed in another plant for the manufacture of fine copper wire in New York state. This equipment differs from that shown in photo E and F only in the design of the charging and discharging lock chambers in place of the baffled vestibules.

✦ ✦ ✦

SPOOLS of wire are packed into an alloy annealing box capable of being hermetically sealed. After packing, this box is purged of air by means of raw gas. It is then loaded upon a tray which is easily rolled through the exterior door of the charging end lock chamber, after which the door sealing the lock chamber. At the proper time interval a door between the discharge end of the cooling hood and the discharge end lock chamber is opened and a tray of finished material extracted into position in the lock chamber by means of a hydraulically driven extracter mechanism. The door into the cooling hood then closes and the tray of material is removed from the equipment through the external door of the lock chamber. The door between the charging end lock chamber and the furnace chamber proper now opens and a hydraulic pusher at the charging end advances the prepared tray through the door and into the heating chamber, thus advancing each tray within the heating chamber and the cooling hood by one length. The charging pusher is then withdrawn and the furnace door closed leaving the lock chamber empty until a fresh charge is placed within it. The charging end of this furnace is shown in Photo G.



Photograph G. Bright annealing fine copper wire on spools. One of two similar controlled atmosphere electric furnaces installed in one plant.

✦ ✦ ✦

Variations in Equipment Designs

TWO only of the possible sealing means on continuous furnaces have been mentioned. There are, of course, innumerable other means of minimizing the loss of special atmosphere any of which are as practical and perhaps as simple as those described.

✦ ✦ ✦

IN all the equipment previously described, the cooling hoods adjacent to the furnace chambers have been of the water jacketed type. Several installations have been made, however, in which cooling is provided by means of banks or sections of water cooled coils through which cold water is continuously forced.

✦ ✦ ✦

WHERE floor space is at a premium and it is desirable to cut the overall length of the furnace equipment, successful cooling has been accomplished by means of a centrifugal fan operated recirculation system by which atmosphere is withdrawn from the cooling hood, passed through a heat exchanger and the cooled atmosphere returned to the hood. This method of cooling is particularly adaptable to large equipments.

✦ ✦ ✦

IN all continuous furnaces of the type described in this paper, the element of controlled time interval between charges is particularly useful since the proper combination of furnace temperature and time to produce specific physical characteristics in any one type of material may be exactly duplicated in succeeding runs. The time interval control mechanism is an intregal part of the electrical interlock system which makes this type of equipment as fool proof as possible, both as to safe use and automatic operation.

YOU ARE CORDIALLY INVITED TO ATTEND
THE PITTSBURGH REGIONAL MEETING
OF THE WIRE ASSOCIATION

AND TO INSPECT THE MODERN WIRE MILL OF
THE PITTSBURGH STEEL COMPANY AT MONESSEN, PA.

FRIDAY, APRIL 1st, 1938

WIRE ASSOCIATION HEADQUARTERS AT THE
WILLIAM PENN HOTEL WILL BE OPEN ALL DAY

A Luncheon will be served at the Monessen Plant
by courtesy of the Pittsburgh Steel Company.

— TECHNICAL PAPERS—OPEN FOR DISCUSSION —

will be presented by well known wire men at the evening meeting in the
Cardinal Room of the William Penn Hotel at 7:30 P. M.

Committee in Charge

J. E. Timberlake,
Jones & Laughlin Steel Co.,
Pittsburgh, Pa.

J. K. Beeson,
Pittsburgh Steel Co.,
Monessen, Pa.

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J. W. Rockefeller, Jr., Section Editor.

Vol. 13 MARCH, 1938 No. 3

Research On Fatigue Properties of Heavy Helical Springs

PART III

By C. T. Edgerton, Chairman,

A. S. M. E. Research Committee On Mechanical Springs

Progress report number three of the sub-committee on heavy helical springs of the Special Research Committee on Mechanical Springs of the American Society of Mechanical Engineers. ✦ ✦ ✦ ✦ ✦

Fatigue Tests on Series "D" Springs of Silicon Vanadium Steel

Section V

MATERIAL used in these springs was from heat No. 63192 of the Crucible Steel Company of America, Park Works. The chemical composition:

Carbon	.94%	**Silicon**	.63%
Manganese	.46%	**Nickel**	.11%
Phosphorus	.019%	**Chromium**	.37%
Sulphur	.014%	**Vanadium**	.17%

This composition conforms to Vanadium Corporation Spec. No. 4-B. Reasons for the inclusion of this grade in the program were indicated in Section I.

✦ ✦ ✦

THREE QUARTER inch round spring bars were rolled and sheared to 83½" long, tapered on both ends, and fabricated into springs in "as rolled" condition and surface finish. The springs were coiled hot, to graduated heights ranging from 12 5/32" for spring D-1 down to 8" for D-9. The corresponding range of pitch measurements was from 2.05" to 1.25". Approximate mean helix diameter was 3¾", to give a spring index of 5. Springs after coiling were cooled in air.

✦ ✦ ✦

Heat Treatment

SPRINGS were reheated to a temperature of 1570°F., and quenched in oil; then drawn for one hour (at temperature) in a lead bath at 850°-890°F., and air cooled. Brinell Hardness measurements on the finished springs ranged from 444 to 477.

✦ ✦ ✦

Calibration Tests

THE springs were first compressed solid several times in a hydraulic spring tester, with the following results:

Spring No.	Coiled Height	Times Solid	Free Hgt. After Test
D-1	12 5/32"	5	9 53/64"
D-2	Defective—see note.		
D-3	10 21/32"	5	9 41/64"
D-4	9 39/64"	5	9 9/32"
D-5	9 21/32"	5	9 11/64"
D-6	9 11/16"	5	9 9/32"
D-7	8 1/32"	5	7 7/8"
D-8	7 27/32"	5	7 53/64"
D-9	7 61/64"	5	7 59/64"

Note: Spring D-2 showed indications of an internal defect, and was disqualified.

✦ ✦ ✦

ENDS of the springs were then ground square in a Gardner Disc grinder.

✦ ✦ ✦

THE calibration tests were conducted in the same manner as those on Series A, B and C. Complete tests data are given in Table VIII. Measurements were taken on prick punch marks, spanning four active coils, on springs D-1, D-3, and D-9.

✦ ✦ ✦

SPRINGS were then forwarded to Wright Field for the fatigue tests, together with six straight pieces, which had gone through the heat treatment wired to the springs. These were intended for tension and torsion tests.

✦ ✦ ✦

AT Wright Field the test procedure was identical with that on Series A. Tests with a magnaflux apparatus indicated no cracks. Measurements, loads and stresses, and results of the fatigue tests, are set forth in Table IX. Results of tension and torsion tests were as follows:

In Tension	
Proportional Limit	**90000**
Yield Strength (.002"/in.)	**150000**
Ultimate Tens. Strength	**205040**
Elongation	**12%**
Ratio—Yield Pt./U. T. S.	**.73**
Modulus of Elasticity	**32.5×10^6**
In Torsion	
Proportional Limit	**108000**
Yield Point (.002"/in.)	**129000**
Modulus of Rupture	**175000**
Ratio—Yield Pt./Mod. of Rupt.	**.74**
Torsional Modulus	**11.8×10^6**

✦ ✦ ✦

THE tests at Wright Field are described in Air Corps Memorandum Report M-56-2783 Part

IV, a copy of which has been furnished to the Sub-Committee by Mr. Johnson.

✦ ✦ ✦

AN analysis of the results of the endurance tests was made, to determine the probable equation of the stress-endurance curve. The equation was found to be:

$$(N+4.59)\ (S-62.82)=3695.38$$

in which both S and N are in thousands.

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HERE, again, as in the case of the plain carbon electric series, the low fatigue limit indicated seems to be inconsistent with the reputation of the material. No adequate explanation has been suggested for this poor performance, but several facts are worthy of note. (a) It is quite possible that the steel may be similar to chrome-Vanadium spring steel in respect to high sensitivity to stress raisers. Experimental evidence on this point may be forth-coming when we go into the second stage of our program,—the effect of surface conditions and finish on endurance. (b) Series "D" springs all developed a rather high M.F.S. solid, after test; some were much higher than any of the plain carbon springs, either basic or electric.

IN Section IV the effect of high solid fibre stress on endurance is shown and discussed. It is there pointed out that the effect seems to be important only when the endurance test is at a high maximum stress. Therefore the endurance limit itself should not be greatly affected. A review was made of all test results to date, and the data assembled in a graphical plot in which one coordinate was the ratio:

$$\frac{\text{M. F. S. in fatigue test}}{\text{M. F. S. solid}}$$

and the other co-ordinate the ratio:

Springs Series D. TABLE VIII Calibration Tests.

Loads in Pounds	Overall Heights Compression Front	Compression Back	Compression Average	Release Front	Release Back	Release Average	Loads in Pounds	Compression Front	Compression Back	Compression Average	Release Front	Release Back	Release Average
	Spring D-1							Spring D-3					
Free	9.575	9.637	9.606	9.526	9.536	9.531	Free	9..367	9.347	9.357	9.302	9.292	9.297
500	9.290	9.296	9.293	9.116	9.127	9.122	500	9.066	9.077	9.072	8.936	8.950	8.943
1000	8.939	8.935	8.937	8.744	8.737	8.741	1000	8.751	8.752	8.752	8.639	8.645	8.642
1500	8.600	8.587	8.594										
2000	8.252	8.241	8.247	8.009	8.000	8.005	2000	8.032	8.026	8.029	7.960	7.955	7.958
2500	7.913	7.901	7.907										
3000	7.568	7.557	7.563	7.300	7.291	7.296	3000	7.400	7.394	7.397	7.154	7.149	7.152
3500	7.223	7.213	7.218										
4000	6.881	6.870	6.876	6.616	6.608	6.612	4000	6.722	6.717	6.720	6.544	6.539	6.542
4500	6.520	6.509	6.515										
5000	6.165	6.155	6.160	5.931	5.920	5.926	5000	6.029	6.023	6.026	5.843	5.838	5.841
5500	5.800	5.789	5.795										
6000	5.424	5.413	5.419	5.333	5.342	5.338	6000	5.371	5.365	5.368	5.325	5.320	5.323
Solid	5.222	5.214	5.218				Solid	5.141	5.146	5.144			
	Spring D-4							Spring D-5					
Free	8.946	8.951	8.949	8.933	8.932	8.933	Free	8.980	8.954	8.967	8.957	8.917	8.937
500	8.605	8.615	8.610	8.591	8.520	8.511	500	8.640	8.657	8.619	8.573	8.593	8.583
1000	8.272	8.280	8.276	8.149	8.158	8.154	1000	8.304	8.306	8.305	8.230	8.234	8.232
2000	7.587	7.581	7.584	7.465	7.461	7.463	2000	7.612	7.609	7.611	7.528	7.524	7.526
3000	6.989	6.985	6.987	6.830	6.829	6.830	3000	7.006	7.003	7.005	6.876	6.873	6.875
4000	6.315	6.311	6.313	6.186	6.184	6.185	4000	6.329	6.327	6.328	6.219	6.218	6.219
5000	5.666	5.664	5.665	5.560	5.560	5.560	5000	5.688	5.685	5.687	5.626	5.624	5.625
Solid	5.188	5.206	5.197				Solid	5.214	5.215	5.215			
	Spring D-6							Spring D-7					
Free	9.068	9.127	9.098	8.860	9.102	8.881	Free	7.762	7.773	7.768	7.760	7.769	7.765
500	8.801	8.814	8.808	8.617	8.642	8.630	500	7.440	7.460	7.450	7.457	7.477	7.467
1000	8.432	8.435	8.434	8.285	8.293	8.289	1000	7.156	7.168	7.162	7.139	7.149	7.144
2000	7.781	7.774	7.778	7.598	7.595	7.597	1500	6.802	6.805	6.804	6.824	6.824	6.824
3000	7.126	7.120	7.123	6.919	6.917	6.918	2000	6.494	6.494	6.494	6.506	6.506	6.506
4000	6.497	6.491	6.494	6.282	6.280	6.281	2500	6.195	6.195	6.195	6.210	6.210	6.210
5000	5.824	5.818	5.821	5.663	5.661	5.662	3000	5.928	5.930	5.929	5.905	5.905	5.905
							3500	5.642	5.642	5.642	5.635	5.635	5.635
Solid	5.230	5.250	5.240				Solid	5.322	5.329	5.325			
	Spring D-8							Spring D-9					
Free	7.690	7.723	7.707	7.687	7.723	7.705	Free	7.822	7.861	7.842	7.820	7.859	7.840
500	7.372	7.391	7.382	7.380	7.401	7.391	500	7.518	7.542	7.530	7.512	7.535	7.524
1000	7.025	7.033	7.029	7.071	7.077	7.074	1000	7.199	7.212	7.206	7.195	7.209	7.202
1500	6.730	6.728	6.729	6.744	6.741	6.743	1500	6.865	6.869	6.867	6.880	6.883	6.882
2000	6.454	6.451	6.453	6.418	6.416	6.417	2000	6.562	6.562	6.562	6.573	6.573	6.573
2500	6.144	6.141	6.143	6.142	6.139	6.141	2500	6.257	6.258	6.258	6.250	6.251	6.251
3000	5.808	5.805	5.807	5.818	5.816	5.817	3000	5.930	5.931	5.931	5.951	5.951	5.951
3500	5.524	5.521	5.523	5.519	5.516	5.518	3500	5.638	5.638	5.638	5.654	5.654	5.654
Solid	5.254	5.257	5.256				Solid	5.313	5.319	5.316			

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Minimum set-up time and rigid, compact design for trouble-free performance are major features that distinguish TORRINGTON'S new, improved and modern line of Spring Making Machinery. High-speed, automatic, anti-friction segment and clutch type coilers are available in eight sizes. Range — .006 to 3/8 inch diameter wire. Listed below are other features of the new designs:

- High-speed production
- Timken bearing equipped
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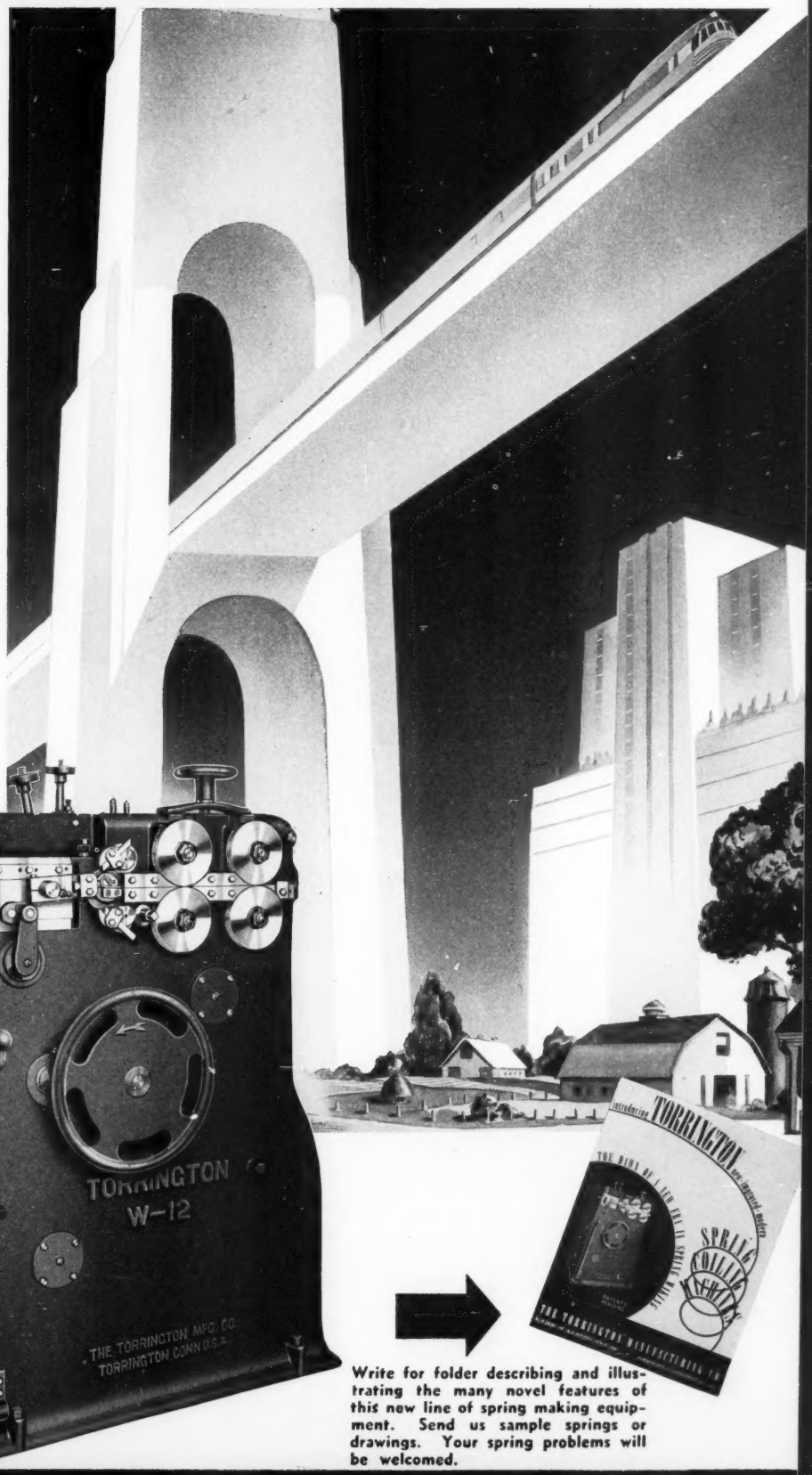

Write for folder describing and illustrating the many novel features of this new line of spring making equipment. Send us sample springs or drawings. Your spring problems will be welcomed.

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Spring No.	Free Height	Solid Height	Total Deflection	Ratio Deflection / Solid Hgt.	Set in Inches: Static Loading Compression No. 1.	2.	3.	Fatigue Loading No. of Cycles 6000	10000	Total Set	Load in Nos. used in Fatigue Test	Stress Rover-Wahl Formula	Number Cycles to Failure
D-1	9.55"	5.22"			Not tested								
D-2	Rejected on preliminary tests.												
D-3	9.28"	5.18"	4.10"	7.91	.02	.04	.00	.00	.00	.06	2008	60000	1750000
D-4	8.90"	5.28"	3.62"	.686	.03	.01	.01	.00	.00	.05	2380	70000	No failure
D-5	8.92"	5.24"	3.68"	.737	.04	.01	.00	.00	.00	.05	4108	120000	438300
D-6	9.07"	5.32"	3.75"	.705	.02	.01	.01	.00	.00	.04	3717	110000	34700
D-7	7.75"	5.34"	2.41"	.452	.01	.00	.01	.00	.00	.02	3064	90000	81100
D-8	7.68"	5.22"	2.46"	.472	.02	.00	.00	.00	.00	.02	3413	100000	120800
D-9	7.84"	5.34"	2.50"	.468	.02	.00	.00	.00	.00	.02	2713	80000	154900
													189200

Brinell Hardness on Machined Flats—425 to 436.

Springs Series "D" — TABLE VIII — Page 2

	Deflection Readings on Four Active Coils. Spring D-1 Compression	Spring D-1 Release	Spring D-3 Compression	Spring D-3 Release	Spring D-9 Compression	Spring D-9 Release
Free	6.29	6.25	6.13	6.09	4.82	4.82
500	6.11	5.96	5.94	5.86	4.66	4.65
1000	5.86	5.69	5.74	5.63	4.46	4.40
1500	5.63				4.24	4.21
2000	5.41	5.23	5.28	5.15	4.03	4.03
2500	5.21				3.84	3.80
3000	4.96	4.76	4.88	4.62	3.63	3.60
3500	4.75				3.41	3.38
4000	4.53	4.32	4.42	4.25		
4500	4.30					
5000	4.03	3.82	3.95	3.78		
5500	3.76					
6000	3.47	3.39	3.41	3.32		
Solid	3.25		3.12		3.12	

Spring Measurements, and Development of Constants.

Spring No.	D-1	D-3	D-4	D-5	D-6	D-7	D-8	D-9
Size of Bar (1)	.753"	.749"	.752"	.752"	.750"	.751"	.752"	.750"
Outside Diameter (2)	4.619"	4.611"	4.596"	4.594"	4.586"	4.557"	4.563"	4.555"
Mean Helix Diameter (3)	3.787"	3.793"	3.778"	3.776"	3.771"	3.758"	3.764"	3.757"
Spring Index (4)	5.033	5.064	5.024	5.021	5.028	5.004	5.005	5.009
Rover-Wahl Correction Factor	1.3082	1.3059	1.3088	1.3090	1.3085	1.3102	1.3102	1.3099
M.F.S. per 1000-lb. Load { Conventional Formula	22632	22986	22621	22609	22761	22591	22537	22676
{ with Rover-Wahl Correction	29607	30017	29606	29595	29783	29599	29528	29703
Capacity Solid—lbs.	6270	6270	5725	5710	5930	4085	3970	4055
M.F.S. Solid { Conventional Formula	141900	144120	129505	129100	134970	92280	89470	91950
{ with Rover-Wahl Correction	185635	188210	169490	168990	176610	120910	117230	120445

(1) Average of six measurements.
(2) Average of six measurements, not corrected for pitch angle.
(3) Corrected for pitch angle (perpendicular to helical axis).
(4) Ratio—Mean Helix Diameter/Size of Bar.

$$\frac{\text{Actual cycles to failure}}{\text{Number of cycles predicted by equation}}$$

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THE datum points for the graph showed a good deal of scatter, but there was an unmistakable trend. Applying the very rough corrections indicated by the graph to the Series "D" test results, a guess might be made that the endurance limit is nearer 70000 p.s.i. than 60000. But even the former figure seems too low. (c) The results of the tension and torsion tests are of interest in this connection. The values are notably better than those at the plain carbon steels. This bears out the evidence from the calibration tests of the springs themselves, which developed some quite remarkable solid stresses. But it leaves unexplained the rather poor showing of the fatigue tests.

Fatigue Tests on Series "E" Springs of Plain Carbon Electric Steel Section VI

MATERIAL used was from Halcomb Steel Company's electric heat No. H7192. Chemical composition:

Carbon	**1.01**
Manganese	**.33**
Phosphorus	**.010**
Sulphur	**.015**
Silicon	**.32**
Nickel	**.09**
Chromium	**.19**

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THREE-QUARTER inch round bars were rolled and sheared to 83½" long, tapered on both ends, and fabricated into springs in "as rolled" condition and surface finish. The springs were coiled hot, to graduated pitch measurements ranging from 1⅞" down to 1-5/32". Approximate mean helix diameter was 3¾", to give a spring index of 5. Springs after coiling were cooled in air.

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Heat Treatment

SPRINGS were reheated to 1550° F. in a natural gas fired furnace, held for 45 minutes, quenched in oil at about 90° F., drawn to 825° F. in a lead bath, one hour at temperature, and cooled in air.

Springs Series E. TABLE X Calibration Tests

Loads in Pounds	Overall Heights Compression Front	Compression Back	Compression Average	Release Front	Release Back	Release Average	Loads in Pounds	Overall Heights Compression Front	Compression Back	Compression Average	Release Front	Release Back	Release Average
	Spring E-1							**Spring E-2**					
Free	8.522	8.596	8.559	8.500	8.532	8.516	**Free**	8.190	8.191	8.191	8.177	8.180	8.179
500	8.136	8.104	8.120	8.135	8.126	8.131	**500**	7.731	7.713	7.722	7.773	7.757	7.765
1000	7.753	7.746	7.750	7.726	7.715	7.721	**1000**	7.343	7.328	7.336	7.358	7.343	7.351
1500	7.370	7.363	7.367	7.302	7.282	7.292	**1500**	7.045	7.029	7.037	6.989	6.974	6.982
2000	7.013	7.005	7.009	6.911	6.898	6.905	**2000**	6.647	6.631	6.639	6.646	6.627	6.637
2500	6.633	6.624	6.629	6.547	6.535	6.541	**2500**	6.289	6.269	6.279	6.283	6.262	6.273
3000	6.292	6.283	6.288	6.155	6.142	6.149	**3000**	5.926	5.908	5.917	5.951	5.929	5.940
3500	5.873	5.864	5.869	5.830	5.816	5.823	**3500**	5.576	5.556	5.566	5.612	5.589	5.601
4000	5.523	5.513	5.518	5.463	5.448	5.456							
Solid	5.177	5.144	5.161				**Solid**	5.268	5.237	5.253			
	Spring E-3							**Spring E-4**					
Free	8.187	8.143	8.165	8.180	8.134	8.157	**Free**	8.076	8.009	8.043	8.062	7.988	8.025
500	7.733	7.716	7.725	7.784	7.765	7.775	**500**	7.578	7.574	7.576	7.626	7.625	7.626
1000	7.398	7.383	7.391	7.398	7.379	7.389	**1000**	7.244	7.244	7.244	7.281	7.274	7.278
1500	7.045	7.027	7.036	6.999	6.978	6.989	**1500**	6.944	6.941	6.943	6.954	6.954	6.954
2000	6.689	6.670	6.680	6.629	6.609	6.619	**2000**	6.585	6.581	6.583	6.568	6.568	6.568
2500	6.366	6.348	6.357	6.275	6.253	6.264	**2500**	6.295	6.290	6.293	6.258	6.256	6.257
3000	5.981	5.960	5.971	5.961	5.937	5.949	**3000**	5.939	5.935	5.937	5.909	5.908	5.909
3500	5.667	5.647	5.657	5.648	5.626	5.637	**3500**	5.602	5.599	5.601	5.591	5.592	5.592
Solid	5.256	5.227	5.242				**Solid**	5.262	5.288	5.275			
	Spring E-5							**Spring E-6**					
Free	8.128	8.162	8.145	8.106	8.116	8.111	**Free**	7.803	7.873	7.838	7.822	7.687	7.755
500	7.697	7.691	7.694	7.708	7.707	7.708	**500**	7.378	7.373	7.376	7.389	7.384	7.386
1000	7.361	7.356	7.359	7.734	7.739	7.333	**1000**	7.046	7.041	7.044	7.000	6.998	6.999
1500	7.035	7.029	7.032	7.014	7.015	7.015	**1500**	6.731	6.726	6.729	6.670	6.668	6.669
2000	6.663	6.659	6.661	6.656	6.657	6.657	**2000**	6.371	6.366	6.369	6.305	6.298	6.302
2500	6.365	6.360	6.363	6.279	6.278	6.279	**2500**	6.052	6.048	6.050	5.965	5.962	5.964
3000	5.967	5.963	5.965	5.957	5.957	5.957	**3000**	5.728	5.724	5.726	5.656	5.653	5.655
3500	5.619	5.615	5.617	5.637	5.637	5.637	**3500**	5.410	5.403	5.407	5.357	5.350	5.354
Solid	5.291	5.272	5.282				**Solid**	5.250	5.192	5.221			
	Spring E-7							**Spring E-8**					
Free	7.811	7.835	7.823	7.798	7.829	7.814	**Free**	7.673	7.699	7.686	7.696	7.694	7.695
500	7.482	7.473	7.478	7.555	7.548	7.552	**500**	7.345	7.337	7.341	7.450	7.444	7.447
1000	7.133	7.122	7.128	7.213	7.204	7.209	**1000**	6.994	6.985	6.990	7.096	7.089	7.093
1500	6.833	6.823	6.828	6.861	6.850	6.856	**1500**	6.667	6.659	6.663	6.728	6.720	6.724
2000	6.510	6.500	6.505	6.534	6.526	6.530	**2000**	6.362	6.354	6.358	6.421	6.413	6.417
2500	6.205	6.194	6.200	6.215	6.204	6.210	**2500**	6.044	6.031	6.038	6.082	6.076	6.079
3000	5.831	5.820	5.826	5.944	5.934	5.939	**3000**	5.749	5.740	5.745	5.811	5.803	5.807
3500	5.528	5.516	5.522	5.627	5.615	5.621	**3500**	5.444	5.435	5.440	5.524	5.516	5.520
Solid	5.343	5.312	5.328				**Solid**	5.320	5.325	5.323			
								Spring E-9					
Free	7.679	7.738	7.709	7.672	7.731	7.702	**2000**	6.370	6.360	6.365	6.430	6.417	6.424
500	7.355	7.343	7.349	7.447	7.439	7.443	**2500**	6.028	6.017	6.023	6.100	6.090	6.095
1000	7.017	7.006	7.012	7.092	7.081	7.087	**3000**	5.719	5.706	5.713	5.802	5.790	5.796
1500	6.697	6.685	6.691	6.767	6.754	6.761	**Solid**	5.325	5.311	5.318			

Loads in Pounds	Overall Heights — Compression: Front	Back	Average	Release: Front	Back	Average	Loads in Pounds	Overall Heights — Compression: Front	Back	Average	Release: Front	Back	Average
	Spring E-10							Spring E-11					
Free	7.626	7.508	7.567	7.621	7.537	7.579	Free	7.593	7.514	7.554	7.584	7.511	7.548
500	7.241	7.219	7.230	7.330	7.313	7.322	500	7.241	7.226	7.234	7.344	7.330	7.337
1000	6.889	6.867	6.878	6.986	6.968	6.977	1000	6.890	6.876	6.883	6.981	6.968	6.975
1500	6.526	6.506	6.516	6.621	6.599	6.610	1500	6.571	6.558	6.565	6.669	6.656	6.663
2000	6.164	6.142	6.153	6.284	6.262	6.273	2000	6.227	6.213	6.220	6.349	6.336	6.343
2500	5.849	5.824	5.837	5.937	5.916	5.927	2500	5.907	5.893	5.900	5.996	5.982	5.989
3000	5.566	5.546	5.556	5.613	5.593	5.603	3000	5.614	5.597	5.606	5.714	5.699	5.707
Solid	5.277	5.236	5.257				Solid	5.332	5.329	5.331			
	Spring E-12							Spring E-13					
Free	7.284	7.337	7.311	7.286	7.336	7.311	Free	7.321	7.252	7.287	7.231	7.221	7.226
500	7.006	6.986	6.996	7.124	7.108	7.116	500	6.945	6.925	6.935	7.005	6.991	6.998
1000	6.681	6.662	6.672	6.759	6.740	6.750	1000	6.598	6.576	6.587	6.679	6.662	6.671
1500	6.344	6.326	6.335	6.419	6.400	6.410	1500	6.283	6.265	6.274	6.317	6.300	6.309
2000	5.994	5.974	5.984	6.061	6.046	6.054	2000	5.957	5.938	5.948	5.985	5.970	5.978
2500	5.695	5.674	5.685	5.743	5.727	5.735	2500	5.659	5.641	5.650	5.691	5.675	5.683
3000	5.412	5.391	5.402	5.493	5.476	5.485	3000	5.407	5.388	5.398	5.426	5.411	5.419
Solid	5.261	5.266	5.264				Solid	5.271	5.259	5.265			

Deflection Readings on Four Active Coils

Loads in Pounds	Spring E-1		Spring E-4		Spring E-8		Spring E-12	
	Compression	Release	Compression	Release	Compression	Release	Compression	Release
Free	5.46	5.43	5.00	4.98	4.79	4.78	4.50	4.50
500	5.22	5.17	4.71	4.71	4.60	4.66	4.34	4.37
1000	4.90	4.90	4.48	4.50	4.38	4.41	4.07	4.15
1500	4.65	4.57	4.28	4.28	4.17	4.19	3.87	3.93
2000	4.38	4.27	4.04	4.02	3.96	3.99	3.65	3.69
2500	4.08	4.00	3.87	3.83	3.72	3.75	3.41	3.46
3000	3.80	3.68	3.65	3.60	3.52	3.57	3.17	3.24
3500	3.51	3.45	3.38	3.36	3.24	3.30		
4000	3.17	3.16						
Solid	2.98				3.12		3.05	

Spring Measurements and Development of Constants

Spring No.	E-1	E-2	E-3	E-4	E-5	E-6	E-7
Size of Bar (1)	.747″	.750″	.746″	.753″	.747″	.741″	.752″
Outside Diameter (2)	4.575″	4.589″	4.576″	4.575″	4.578″	4.552″	4.563″
Mean Helix Diameter (3)	3.768″	3.785″	3.777″	3.771″	3.778″	3.763″	3.762″
Spring Index (4)	5.044	5.047	5.063	5.008	5.058	5.078	5.003
Rover-Wahl Correction Factor	1.3074	1.3072	1.3061	1.3099	1.3064	1.3050	1.3103
M.F.S. per 1000-lb. ld. — Conventional Form'la	23021	22845	23165	22489	23082	23550	22525
M.F.S. per 1000-lb. ld. — with Rover-Wahl Cor.	30098	29863	30256	29458	30154	30733	29515
Capacity Solid—lbs.	4480	3970	4115	3980	4000	3790	4000
M.F.S. Solid — Conventional Form'la	103135	90690	95320	89510	92330	89250	90100
M.F.S. Solid — with Rover-Wahl Cor.	134840	118560	124500	117240	120620	116480	118060

Spring No.	E-8	E-9	E-10	E-11	E-12	E-13
Size of Bar (1)	.748″	.746″	.748″	.748″	.741″	.747″
Outside Diameter (2)	4.561″	4.547″	4.531″	4.557″	4.535″	4.548″
Mean Helix Diameter (3)	3.766″	3.754″	3.737″	3.764″	3.752″	3.760″
Spring Index (4)	5.035	5.021	4.996	5.032	5.063	5.033
Rover-Wahl Correction Factor	1.3080	1.3090	1.3108	1.3082	1.3061	1.3082
M.F.S. per 100-lb Ld. — Conventional Form'la	22915	23024	22739	22903	23481	22972
M.F.S. per 100-lb Ld. — with Rover-Wahl Cor.	29973	30138	29806	29962	30669	30052
Capacity Solid—lbs.	3880	3615	3530	3495	3230	3320
M.F.S. Solid — Conventional Form'la	88910	83230	80040	80050	75840	76270
M.F.S. Solid — with Rover-Wahl Cor.	116295	108960	104820	104720	99060	99770

(1) Average of six measurements.
(2) Average of six measurements, not corrected for pitch angle.
(3) Corrected for pitch angle (perpendicular to helical axis).
(4) Ratio—Mean Helix Diameter/Size of Bar.

TABLE XI

SET IN INCHES

Spring No.	Free Height	Solid Height	Total Deflection	Ratio Deflection / Solid Height	Static Loading Compression No. 1.	Static Loading Compression No. 2.	Static Loading Compression No. 3.	Fatigue Loading No. Cycles 6000	Fatigue Loading No. Cycles 10000	Fatigue Loading Total Set	Load in lbs. used in Fatigue Test	Stress Rover-Wahl Formula	Number of Cycles to Failure
E-2	8.23″	5.28″	2.95″	.559	.01″	.01″	.00″	.01″	.00″	.03″	3593	108000	95200
E-3	8.19″	5.27″	2.92″	.554	.01″	.00″	.00″	.00″	.00″	.01″	3326	100000	107100
E-5	8.16″	5.34″	2.82″	.528	.02″	.01″	.01″	.01″	.00″	.05″	3060	92000	197200
E-6	7.77″	5.29″	2.48″	.469	.01″	.00″	.01″	.00″	.00″	.02″	2794	84000	232600
E-7	7.82″	5.35″	2.47″	.462	.01″	.00″	.01″	.00″	.00″	.02″	2927	88000	281600
E-9	7.73″	5.34″	2.39″	.447	.01″	.00″	.00″	.00″	.00″	.01″	2528	76000	Note: 1650000
E-10	7.60″	5.29″	2.31″	.437	.01″	.00″	.00″	.00″	.00″	.01″	2395	78000	851000
E-11	7.56″	5.37″	2.19″	.408	.00″	.00″	.01″	.00″	.00″	.01″	2661	80000	367000

Note: Did not fail.

Brinell hardness of the finished springs was 415.

✦ ✦ ✦

Calibration Tests

THE springs were first compressed solid a number of times in a hydraulic spring tester, with the following results:

Spring No.	Initial Free Hgt	Initial Pitch	Times Solid	Final Free Hgt
E-1	11.32″	1.81″	22	8.71″
E-2	9.82	1.56	25	8.30
E-3	9.73	1.50	50	8.25
E-4	8.90	1.38	10	8.18
E-5	8.92	1.38	10	8.27
E-6	8.34	1.28	10	8.00
E-7	8.33	1.28	10	7.98
E-8	8.05	1.19	10	7.82
1-9	8.03	1.19	10	7.82
E-10	7.91	1.16	10	7.75
E-11	7.80	1.16	10	7.70
E-12	7.60	1.13	10	7.48
E-13	7.48	1.13	10	7.44

✦ ✦ ✦

ENDS of the springs were then ground to a square bearing, on a Gardner Disc Grinder.

✦ ✦ ✦

THE calibration tests were then conducted in the same manner as for the earlier groups, described in previous sections of this report. Complete test data are given in Table X. Measurements were taken on prick punch marks spanning four active coils, on Springs E-1, E-4, E-8, and E-12, for study of the torsional values and number of active coils.

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SPRINGS were then forwarded to Wright Field for the fatigue tests, together with several pieces of the steel, which had gone through the heat treatment wired to the springs. These were intended for tension and torsion tests.

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AT Wright Field the springs were first compressed solid several times, and the height measured after each compression. Magnaflux tests indicated no cracks or other defects. Eight of the springs were then run successively through the endurance test. Measurements, loads and stresses, and test heights are summarized in Table XI.

✦ ✦ ✦

A MATHEMATICAL analysis of the endurance test data, along the lines described in Section I, developed as the equation for the probable S-N curve of the group:

$$(N - 40.30)\ (S - 75.60) = 1996.06$$

both S and N in thousands. Figure V shows a graphical plot of the equation, and of the actual test observations.

✦ ✦ ✦

COMPARING this graph with that from the plain carbon basic reported in Section II, it is found that throughout most of the stress range the basic steel gives somewhat greater endurance. The superiority ranges up to nearly 50%, measured in number of cycles to failure. At 76000 p. s. i.

(*Please turn to Page 155*)

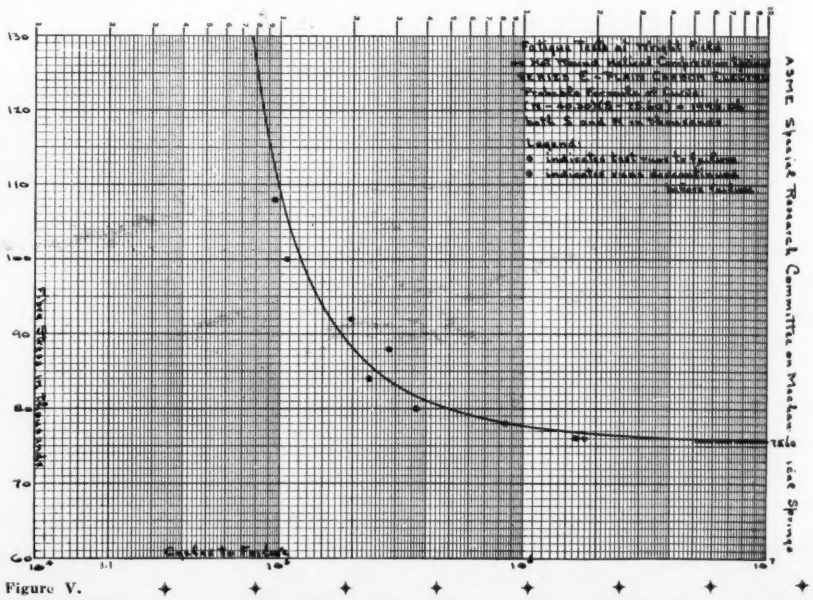
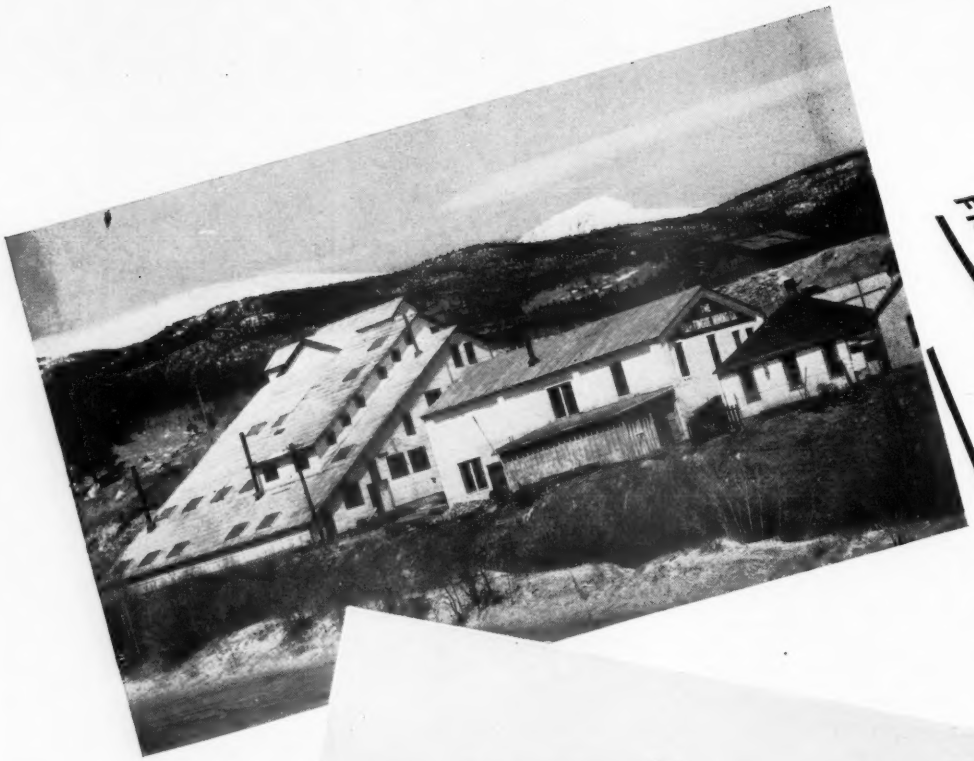


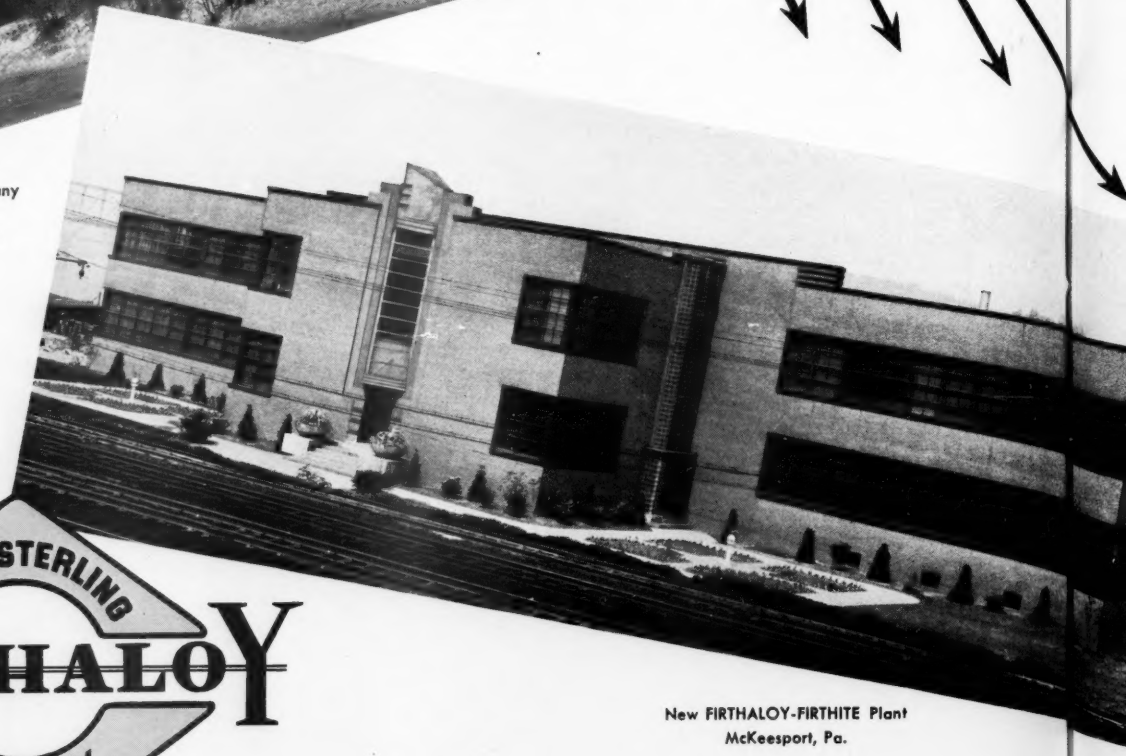
Figure V.

✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦



Wolf Tongue Mining Company
Boulder, Colorado
Owned by Firth-Sterling

FROM MINE TO USER



New FIRTHALOY-FIRTHITE Plant
McKeesport, Pa.

FIRTH-STERLING
FIRTHALOY
QUALITY

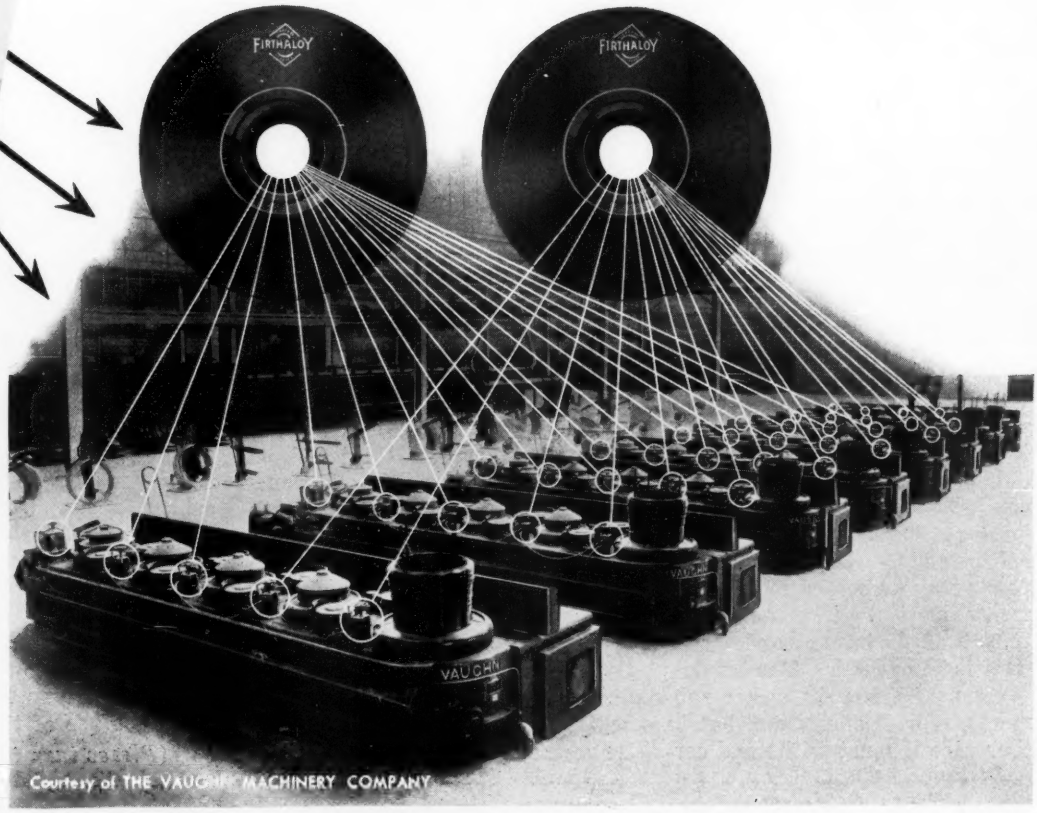
FIRTH-STERLING

STEEL COMPANY

from the mines to the mills every step controlled by

FIRTH – STERLING

FROM the Tungsten ore to the finished die in your mill every operation in the manufacture of FIRTHALOY Tungsten Carbide Dies is controlled by Firth-Sterling. Expert selection and milling of the Tungsten ore—close laboratory control—and skilled workmanship are combined to obtain that consistent uniformity and high productive quality which has resulted in widespread adoption of FIRTHALOY Dies in Wire Mills where high production, superior finish and long die life is desired.



Courtesy of THE VAUGHN MACHINERY COMPANY

McKEESPORT, PA.
YORK CHICAGO
H ORD PHILADELPHIA
LOS ANGELES DETROIT
CLEVELAND DAYTON
WIRE DIVISION
McKEESPORT, PA.

New Signal Corps Field Wire

By Geo. P. Bush,
Major, Signal Corps., U. S. A.
Washington, D. C.

THERE are many readers of Wire and Wire Products who have very little concern in time of peace with military field wire, but who will have much concern with it in the event of a war which involves this country. The reason for this is that this wire is not commercial and the quantities purchased in peace time are insignificant. On the other hand, in wartime the monthly footage of this wire would probably be very great. Moreover, this wire is of such a technical nature and occupies such a high priority for procurement that it will affect either directly or indirectly most of the wire plants in this country.

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THE object of this article, therefore, is to acquaint the wire industry with the present trend of this military wire, to explain certain features of the latest design of this wire (known as Wire W-110-B), and to state the reasons why the Signal Corps adopted this particular design.

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ON November 20, 1937 there was approved for use U. S. Army Specification No. 71-478-C which covers a twisted pair wire, each conductor of which consists of four coated steel strands and three coated copper strands. One copper strand has a 14-mil diameter, while all others have 13-mil diameters. The conductor may be laid up either bunched or stranded. Either a galvanized or tinned coating is required on the steel strands, while the copper strands may be coated with either Amaloy or tin. The tensile strength of the bare stranded conductor is 145 pounds. The insulating compound may be either rubber or a rubber substitute, but in either case it must withstand certain rigid physical and electrical requirements.

✦ ✦ ✦

A NEW requirement is that the capacitance at 1000 cycles shall not exceed .08 microfarad per 1000 feet. The D-c resistance shall not exceed 36.5 ohms per 1000 twisted pair loop-feet. The weight of the finished twisted pair shall not exceed 25 pounds per 1000 feet.

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THE foregoing briefly describes the wire on which the Signal Corps has recently advertised for sealed bids. The advertisement called for two separate items: one on reels and the other in coils, the two items **not** being on an "all or none" basis, thus giving the possibility of two manufacturers getting experience in manufacture. This circular proposal will be given wide circulation, having in mind the following objects. Aside from getting as much wire as it can for the money, the Signal Corps wants to see the wire industry become familiar with this emergency wire and particularly with certain features of it which would speed up its production in war-time. These features are rubber substitutes, bunching, galvanizing, capacitance, each of which will be briefly commented upon hereinafter.

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THE United States procures its natural rubber largely from the East Indies, with additional sources in Africa and South America. In time of war, the continuance of the supply from these sources would undoubtedly be extremely uncertain. We have adopted a policy of the substitution of motor transportation for animal transportation. Motor vehicles require tires and the latter require rubber, large quantities of rubber. It can be deduced from the foregoing that the Signal Corps may properly expect to find its allotment of raw rubber gradually diminished to the vanishing point. The Signal Corps desires to meet the implications of this situation face-to-face in peacetime and thus avoid the embarrassment due to a situation such as caused the so-called "sunshine" wire during the World War. It desires to know the facts about rubber substitutes by buying and testing them, and by permitting industry to use them in production.

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BUNCHING the conductor has been successfully accomplished by two manufacturers who used continuous vulcanizers. By using this method the rate of production is greatly increased; the bottle-neck of a limited number of stranding machines is avoided; interference with other stranded military wires is avoided; and the cost of the stranding operation is saved. The Signal Corps is thus very anxious to have the wire industry learn through experience how to bunch this wire. Now that the tensile strength of the conductor has been reduced to 145 pounds, methods of bunching other than by the use of a continuous vulcanizer can be used.

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TIN comes from great distances overseas and thus bears the same strategic difficulties as does rubber. On the other hand, galvanization of the steel strand has become more practicable due to the reduction of tensile strength of the conductor to 145 pounds and due to the more efficient galvanizing processes now used. In like manner Amaloy is specified to avoid the use of tin on copper.

(*Please turn to Page 136*)

New Method For Control Of Oxidization And Heat Radiation On A Galvanizing Kettle

By W. H. Spowers, Jr.
Consulting Galvanizing Engineer,
New York, N. Y.

WE have in the galvanizing operation, two very serious dollars and cents losses.

First—The accumulation of oxides on molten zinc.

Second—The heat radiation losses which occur almost entirely from the surface of the metal.

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ON the surface of all molten metals, when exposed to the air, oxides readily form. These oxides may be skimmed from the surface of the metal, but almost immediately there re-forms a film of oxide and this continues to grow, in some cases very rapidly but in any event, very steadily and continuously as long as the metal remains molten.

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WHEN we consider zinc as the subject, oxide thus formed contains approximately 70% zinc and these oxides, which are made of course, from the fluid zinc, have cost the price of Prime Western metal. However, the recovery by sale on this oxide is a very small percentage of the actual cost of the zinc content and this is due primarily to the difficulty of converting zinc oxide into a useful product.

✦ ✦ ✦

WIRE galvanizing, pipe galvanizing, and many other types of galvanizing stagger under many thousands of dollars loss principally due to the heretofore impossibility of preventing this loss.

✦ ✦ ✦

IT will be interesting to take as an example of this loss due to oxidization, one standard straight wire kettle.

IN all straight wire operations, the wire enters the galvanizing kettle at one end and leaves from the other. Usually the zinc surface at the entrance point of the wire, is protected from oxidization by the volatile flux cover which is continuously being formed by the action of the No. 20 flux wash, but the remainder of the zinc surface is left open to accumulate oxides from one drossing to another. That this loss in oxides is serious will be seen from the statistics taken from one standard straight wire installation as follows:

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WITH an exposed surface of approximately 65 sq. ft., this installation accumulated 102,792 pounds of zinc oxides during one year's operation. This accumulation of zinc oxide contained about 70% zinc, which at the market price, represented a loss of approximately $5000 by the operator and it may be noted that this was in one year's operation.

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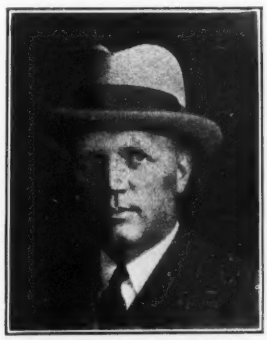
IN this plant, this loss totalled nearly 10% of the new zinc used and when we consider that



W. H. SPOWERS, JR.,
Consulting Galvanizing Engineer

over 41,000 **net tons** of zinc are used annually in the wire field, the enormity of this loss throughout the country is at once apparent.

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BUT this is only the straight wire field. Let us consider a standard pipe installation.

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A PIPE or tube kettle usually is divided by a dam lengthwise and the pipe is fed into the kettle sidewise. A blanket of volatile flux covers the entrance side of the dam for the purpose of wetting the flux washed pipe and this blanket of volatile flux effectively prevents any oxidization on this portion of the kettle. But the half of the kettle surface on the other side of the dam is left open and free to accumulate oxides.

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ON the pipe kettle under consideration this one half of the kettle on the outgo side, which was permitted free access to the air, was approximately 36 sq. ft., and yet there were produced on this relatively small surface, 1,443,552 pounds of zinc oxide in one year. This represented a gross loss of over 25% of the new zinc used.

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THEN again, when we realize that over 54,000 **net tons** of new zinc are used annually in this country for galvanizing pipe, the enormity of this loss at once becomes apparent.

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IT must be appreciated by the reader, that only two examples thus far have been given covering

only two types of galvanizing. There are approximately 2400 galvanizing installations in this country which are permitted to stand at night times, over shut down periods and week-ends, to steadily accumulate this costly residuum.

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EACH succeeding day is the scholar of its predecessor and it was realized that if a material was to be perfected to successfully prevent this loss in oxides, it should also operate successfully in forbidding the loss of heat by radiation now escaping from the surface of the metal.

✦ ✦ ✦

TO successfully accomplish both of these purposes, first, the elimination of the oxides and second, the control of heat radiated, such material must be capable of laying on the surface of molten zinc, maintained between 820° F. and 900° F. and not burn, char, flash, melt or cake. Preferably it should form, upon contact with the zinc, a layer of inert gas. Such material again should be of such nature as to efficiently and effectively insulate the heat and must be easily applied and removed for repeated use.

THE value of creating in one's mind the determination to do a thing is of great psychological advantage and although the difficulty of meeting these specifications had the look of utter impossibility the magnitude of the losses given above made it necessary that an attempt be made to meet them.

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THERE is one place where you can find success without much effort—in the dictionary, but in this case, while a successful outcome was achieved, it was not found in that book. Sufficient it is to say that the number of different materials which were studied and the combination of materials which were tested, yielded a laboratory number for the finally accepted product of G. B. 412.

✦ ✦ ✦

THIS material, when placed on the surface of the zinc remains in its original form and is granular in appearance. It will not burn, char, flash, melt or cake and is easily applied and removed.

✦ ✦ ✦

WHEN placed upon the surface of the zinc, this granular material forms a blanket of inert gas over the entire surface of the zinc thus covered and prevents the contact of the zinc with the air thus preventing any zinc oxide whatever.

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ALSO so effective are its insulating properties, that savings in heat lost through radiation, have already been reported as between 35 and 50% depending upon the depth or thickness of the blanket used.

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THE technique of application suggested in the use of this material is simple but should be accurately followed and may be given as follows:

(1) Using a skimming tool, start at one end of the kettle and skim the surface free from oxides.

(2) Immediately following the skimming tool and before any oxidization takes place, spread the blanketing material on the surface of the zinc to the desired depth. Application thus FOLLOWS the skimming tool over the entire surface to be covered.

(3) So effective is this material in blanketing the heat within the kettle that the operator is warned to watch carefully the temperature of the bath at the time of the first application to obviate the possibility of excessive temperature. In some instances even the pilot burners have been found to be of too great a capacity.

New Signal Corps Field Wire

(*Continued from Page 134*)

CAPACITANCE enters the picture for the first time due to the fact that this wire is primarily used for telephonic conversations. Wire is wanted that will "talk-up" over long lengths of twisted pair—even up to thirty miles or more. To this end the Signal Corps has done three significant things: improved the efficiency of all terminal equipment; the telephone substations, the switchboards, the repeating coils, etc.; prescribed the insertion of loading coils between every linear mile of twisted pair wire; and finally reduced the capacitance in the wire itself by specifying a minimum of .08 microfarad per 1000 feet. As time goes on and industry gains experience with new fillers which improve the capacitative effect, this minimum will be gradually moved down to about .07 microfarads per 1000 feet.

✦ ✦ ✦

THE strength of the conductor has been reduced from 200 to 145 pounds which means that the quality of the steel strand is reduced from piano wire grade to that of the better rope wires. This permits the use of basic steel and makes available greater productive capacity. As previously mentioned it facilitates the galvanizing process and the bunching process.

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IT must be borne in mind that certain of the aforementioned processes are optional rather than compulsory. While the Signal Corps seeks experience along the lines of bunching, galvanizing and rubber substitutes these features are not mandatory and the successful bidder may exercise his option under the specification.

Outstanding Personalities of the Wire Industry

Changes in Personnel Sleeper & Hartley, Inc.

THE new personnel of Sleeper & Hartley, Inc., who have taken over the management of the business since the death of Mr. Sleeper and the retirement of Mr. Hartley, is shown herewith.

✦ ✦ ✦

THESE are the men who create and manufacture "The Machine that Put the Rings in Springs" as well as other wire machines for every purpose.

✦ ✦ ✦

IN 1879 Mr. F. H. Sleeper designed and built his first fully automatic Wire Forming Machine and continued creating wire machinery until the demand was such that he incorporated a Company in 1914, under the well known trade name of Sleeper & Hartley, Inc., Worcester, Massachusetts.

✦ ✦ ✦

THIS firm has always enjoyed a good reputation in this and many foreign Countries for the very practical nature and the great productiveness of the machines produced.

✦ ✦ ✦

NEWLY designed machines appeared constantly until Mr. Sleeper's health made it necessary for him to retire. Since then, a great many new machines have been developed by men trained under Mr. Sleeper's guidance and

R. F. RUSSELL,
Treasurer, Sleeper & Hartley, Inc.

W. H. BLOUNT,
President, Sleeper & Hartley, Inc.

at present the Company employs approximately 100, with annual sales of over a third of a million dollars.

✦ ✦ ✦

DURING the past few years, he had not been as active in the business as formerly, during which period Mr. William H. Blount assumed practically the entire responsibility of designing, manufacturing and selling the extremely varied products of the Company.

✦ ✦ ✦

JUST a few short months prior to his death, Mr. Sleeper completed all arrangements (through the office of Atwood, Arnold & Company of Boston) whereby the business of Sleeper & Hartley, Inc., would be perpetuated, thus making certain that its large clientele and industry as a whole would be assured of receiving efficient and prompt service and more extended courtesies.

✦ ✦ ✦

AT the first Annual Meeting of the stockholders, subsequent to Mr. Sleeper's death, the following Officers were elected: William H. Blount, President and General Manager; Raymond F. Russell, Treasurer; Carl E. Spaulding, Assistant Treasurer. The new Board of Directors consists of William H. Blount, Raymond F. Russell, Clarence S. Arms, a recognized authority in wire problems and long acting as Consulting Engineer on Wire Mill Equipment for the Company; George H. Mirick, one of Worcester's leading attorneys; Joel H. Atwood of Newton, Mass., one of New England's outstanding authorities in the fields of Sales Planning and Estate Conservation.

✦ ✦ ✦

IN addition to the above, the Company maintains a well organized and highly efficient Engineering Department, under the direct leadership of Clayton F. Fisher, which handles the continuous flow of every conceivable proposition of any importance dealing with the wire working industry and improvements in methods and means of production. This range covers machinery to handle wires from 1/1000 of an inch in diameter to 5/8" square stock as well as strip steel and special shaped wires used to produce filaments, springs, flexible casings, flexible tubes, air conditioning tubes, cable armoring, lock washers, filters, rings, key ringing, flexible shafts, choke casing, shaped wire and forming machines. Also complete Wire Mill Equipment for producing all grades of wire from the rod to the very finest sizes. This Department, which has developed an Inter-

C. E. SPAULDING,
Assistant Treasurer, Sleeper & Hartley, Inc.

Outstanding Personalities of the Wire Industry

C. F. FISHER,
Manager, Engineering Department, Sleeper & Hartley, Inc.

national reputation, is fully qualified to handle requirements of outside business concerns to assist in solving their individual problems in the matter of machinery where speed, accuracy and efficiency are required.

✦ ✦ ✦

THERE follows a brief background of the active officials mentioned above.

✦ ✦ ✦

William H. Blount

A GRADUATE of Worcester High School, chief draftsman at Morgan Spring Company, with Mr. F. H. Sleeper and for G. L. Brownell, Inc., manufacturers of twisting and stranding machinery for the textile industry. Then followed his association with Mr. Sleeper in the perfection of his invention of the Universal Spring Coiler, the first completely automatic Spring Coiling Machine in the World. He was one of the incorporators of Sleeper & Hartley, Inc. in 1914 and subsequently serving as Superintendent, Chief Engineer and Treasurer. Such continued close contact with all phases of the Wire Working Industry for over thirty years, fully qualifies him for his new position as President and General Manager.

✦ ✦ ✦

Raymond F. Russell

GRADUATE of Dartmouth College, Tuck School of Finance and Business Administration in 1915. After two years auditing experience associated with a Certified Accountant, he served during the war as an officer in the Finance Division. Since then he has served two large corporations in various executive capacities in connection with accounting, costs and sales development work. Mr. Russell has been associated with Sleeper & Hartley, Inc. since last May.

✦ ✦ ✦

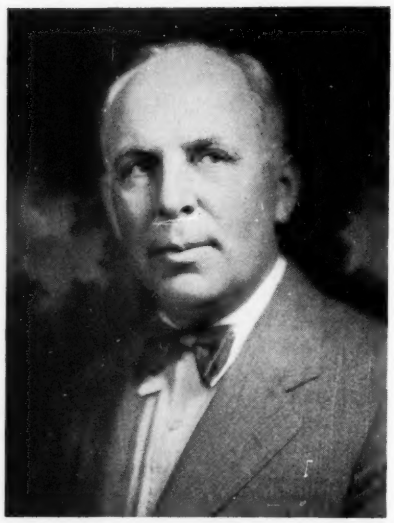
Carl E. Spaulding

SINCE graduating from a prominent Boston business College, he has been identified with engineering departments in mechanical, architectural and construction fields several years of which he was connected with the sales and construction department of the U. S. Gypsum Company's New York office, and later in a sales supervisory capacity with the New York Branch of the New England Mutual Life Insurance Company. Mr. Spaulding has been associated with Sleeper & Hartley, Inc. as Assistant Treasurer for the past three years.

✦ ✦ ✦

Clayton F. Fisher

EDUCATED in the Schools of Worcester, attended English High School and Worcester Boys Trade Schools, and was a graduate of the Mechanical Engineering Division of the International School of Scranton, Pa. Since that time, he has been intimately associated with machine design for the past twenty-two years. He has had wide experience in the field of modern design of automatic and semi-automatic machinery, Wire Mill and continuous Wire Drawing equipment, Paper Mill



C. S. ARMS,
Consulting Wire Mill Engineer, Sleeper & Hartley, Inc.

design, anti-friction adaptations, as well as estimating, cost, production, distribution and sales engineering experience. His association with the Wickwire Spencer Steel Company for a period of thirteen years, the last seven years of which he served as Master Mechanic and Safety Supervisor of the Spencer Works, has aptly fitted him for the position to which he has been appointed with this Company.

✦ ✦ ✦

Clarence S. Arms

GRADUATE Mechanical Engineer from Union College in 1905. Served as Resident Construction Engineer with John A. Roebling's Sons Company from 1906 to 1910, and then as Assistant Superintendent until 1916, having charge of Open Hearth and Rolling Mills. He then moved to Palmer, Massachusetts in 1916 and served as General Manager for Wright Wire Company, remaining there until 1921. In the year of 1923 he joined the Thompson Wire Company as General Manager of its Worcester plant. However, since 1922 he has served this firm as Consulting Wire Mill Engineer.

Outstanding Personalities of the Wire Industry

J. G. McGreevy, Vice President, Apco Mossberg Corporation

IN connection with the recent reorganization of the Apco-Mossberg Corporation of Attleboro, Mass., **Mr. J. G. McGreevy** has been elected vice-president of the company. Mr. McGreevy was born in Providence, educated in the grammer and high schools of that city. In 1924 he joined the sales force of the company to handle the reel and spool end of the business, and from then until 1930 travelled constantly, calling on both the copper and steel wire trade as well as the wire rope industry. In 1930 Mr. McGreevy was advanced to sales manager of the Reel and Spool Department which position he held until January, 1938 when he was elected vice-president of the company.

Christopher Leece Retires After 53 Years Service With The American Steel & Wire Co.

AFTER better than half a century of service at the Newburgh plant at Cleveland of the American Steel & Wire Co., Christopher Leece is retiring on pension.

CHRISTOPHER LEECE
American Steel & Wire Co.

MR. Leece's record at the plant began almost 53 years ago on January 1, 1885, when he started work as a weigher at the Cleveland Rolling Mill Co., which was later taken into the U. S. Steel Corpn. subsidiary. He became a wire drawer in July, 1888, and in 1905 was made a gauger.

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HE served as foreman for No. 3 and No. 4 Cleaning Cranes and the Annealing House from 1910 to 1916 and from May, 1935, up to the present time has been supervisor of the rejection room. Mr. Leece was honored in January, 1935, when he was presented with his 50-year gold service medal.

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Republic Personnel Changes

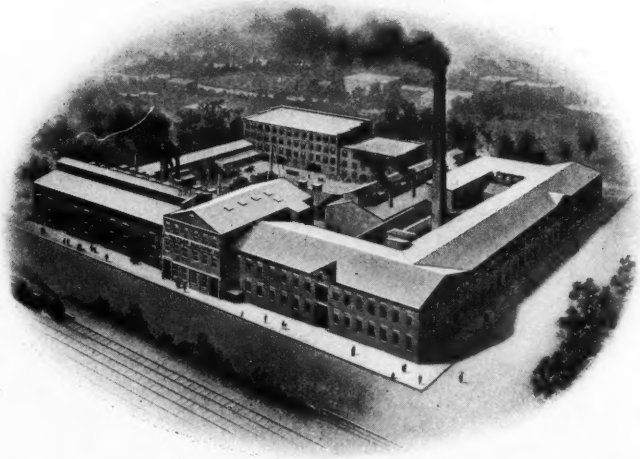
CARL C. BROWN, district sales manager of Republic Steel Corporation at Birmingham since the merger with Gulf States Steel Company last year, has been

(*Please turn to Page 150*)

THE WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON, NEW JERSEY, U. S. A.



ENGINEERS **MACHINISTS**

MANUFACTURERS OF

ELECTRICAL WIRE & CABLE, WIRE ROPE, CORDAGE & GENERAL MACHINERY

YOUR INQUIRIES ARE INVITED

Exports and Imports of Wire

Exports of Iron and Steel Wire Products in Dec. 1937 and Dec. 1936
(In Gross Tons)

	DEC. 1937	NOV. 1937	DEC. 1936
Wire rods	2,811	6,445	1,467
Strip steel	8,453	7,105	5,220
Plain, black or galvanized iron or steel wire	3,183	3,232	5,389
Barbed wire and woven wire fencing	1,987	1,807	5,145
Woven wire screen cloth	106	66	119
Wire rope	529	358	292
Insulated iron or steel wire and cable—see analysis below			
Other wire and manufactures	520	475	832
Wire nails	1,678	685	890
Tacks	33	46	31
Other nails, including staples	327	187	266
Bolts, machine screws, nuts, rivets and washers	744	779	734
Total, these 11 classifications	20,371	21,185	20,385

Imports of Iron and Steel Wire Into the United States
(In Gross Tons)

Concrete reinforcement bars	85	43	254
Hollow bar and drill steel	191	188	125
Wire rods	634	1,405	1,386
Barbed wire	589	1,446	1,529
Round iron and steel wire	484	250	417
Telephone and telegraph wire	17	.....	.....
Flat wire and strip steel	262	669	289
Wire rope and strand	232	188	180
Other wire	65	97	259
Hoops and bands	1,878	1,582	1,670
Nails, tacks and staples	432	552	704
Bolts, nuts and rivets	9	16	23
Total, these 12 classifications	4,878	6,436	6,836

Exports of Insulated Wire and Cable, December, 1937

	Foreign		To U. S. Possessions	
	Pounds	Dollars	Pounds	Dollars
Insulated iron or steel wire and cable	20,385	$ 4,294	1,645	$ 453
Rubber-covered wire	590,676	143,628	108,683	21,858
Copper weatherproof wire	286,907	54,734	91,851	16,119
Copper telephone cable	27,300	5,021	512	110
Other insulated copper wire	318,939	85,065	192,995	89,162
Nickel-chrome electric resistance wire	20,080	23,145	1	4
Total, these 6 classifications	1,264,287	$315,887	395,687	$127,706

December Exports Maintained At High Level

EXPORTS of iron and steel products (excluding scrap) from the United States in December, 1937 amounted to 306,647 gross tons valued at $20,723,541 in maintaining the exceptionally high level of trade which had prevailed throughout the preceding 11 months of that year. In comparison with the totals for November (301,280 tons valued at $22,871,417), a slight volume increase was registered, but the value recorded a decline. The lower value was the result of reduced shipments within the higher price bracket, notably of tin plate. Against the 135,147-ton trade valued at $9,998,926 in December 1936, the gains were marked.

Leading Products in December Shipments

THE outstanding products shipped during the reviewed month were ingots, blooms et cetera, totalling 64,236-ton total in comparison with 36,231 tons in November, and 2,359 tons in December 1936; pig iron 36,545 tons against 26,225 tons and 3,901 tons; tin plate 31,364 tons against 52,795 tons and 24,377 tons; rails 28,596 tons against 26,475 tons and 4,835 tons; plate 25,611 tons against 35,908 tons and 22,342 tons; black steel sheets 21,128 tons against 26,250 tons and 10,489 tons; and steel bars 18,062 tons against 16,296 tons and 6,499 tons.

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European Purchases Lead In December

EXPORTS during December were distributed as follows:

	Tons	Percent of Total
Europe	117,441	38.3
Far East	98,830	32.2
North and Central America and the West Indies	41,830	13.6
South America	40,695	13.3
Africa	7,851	2.6
	306,647	100.0

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Slight Gain in December Import Volume

IMPORTS of iron and steel products (excluding scrap) into the United States during December 1937 amounted to 25,104 gross tons valued at $1,568,033 in registering a volume increase of 5 percent over the 23,985 tons received in November. However, the November value of $1,647,464 was 5 percent higher than in December. Against the December 1936 import trade (38,514 tons valued at $1,706,333) a sharp 35 percent decline was recorded in volume. The decline in value was 8 percent.

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Pig Iron Tops December Import List

PIG iron was the leading product imported in December (from the standpoint of tonnage), its total of 9,128 tons (6,661 tons in November; 10,423 tons in December 1936) coming principally from British India 6,460 tons, and the Netherlands 2,502 tons. Structural shapes ranked next with 3,396 tons (3,968 tons; 5,303 tons), and came chiefly from Belgium (2,987 tons). Next in importance were solid and hollow bars 2,462 tons (1,811 tons; 3,476 tons) taken mostly from Belgium (1,728 tons), and Sweden (481 tons). The steel pipe trade of 2,884 tons (2,795 tons; 1,991 tons) followed, with Germany (2,279 tons) accounting for practically the entire volume. Hoops and bands followed with a 1,878-ton total (1,562 tons; 1,670 tons), the outstanding countries of supply being Germany (1,692 tons), and Sweden (400 tons).

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Belgium and British India Lead December Supplies

BELGIUM was the outstanding country of supply in Decem-

ber accounting for 7,134 tons of the aggregate trade, the most prominent items being shapes (2,-987 tons), solid and hollow bars (1,728 tons), and hoops and bands (1,643 tons). British India accounted for 6,460 tons of pig iron. Germany ranked next with 3,907 tons of mostly steel pipe (2,279 tons), barbed wire (469 tons), and nails (412 tons). Then came Sweden's share of 3,010 tons in which wire rods (610 tons), solid and hollow bars (481 tons), round iron and steel wire (435 tons), and steel pipe (400 tons) were outstanding. The Netherlands followed with 2,671 tons consisting of principally pig iron (2,502 tons).

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CARD CLOTHING receipts in December totaled 24,403 square feet valued at $43,562 in comparison with 28,216 square feet valued at $41,944 in November. The outstanding supplier was the United Kingdom with 20,008 square feet valued at $34,935.

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THE December WIRE HEDDLE import trade amounted to 227,000 pieces against 223,000 pieces in November and was covered by Germany (200,000), and Switzerland (27,000).

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IMPORTS of WIRE FENCING AND NETTING, galvanized before weaving, totaled 53,550 square feet (5,000 square feet in November) and came from Belgium (41,700), and Germany (11,-850). Of that galvanized after weaving, the December total of 355,600 square feet (1,248,950 square feet) came from Belgium (30,600), and the Netherlands (325,000).

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IN December, receipts of WIRE CLOTH AND SCREEN amounted to 61,248 square feet in comparison with 51,106 square feet in November, the principal suppliers being Germany (33,324), and Canada (13,661).

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FOURDRINIER AND OTHER PAPER-MAKING WIRE receipts in December at 23,938 square feet compared with 37,427 square feet in November and were chiefly covered by Austria (8,435), Sweden (7,095), and France (5,-510).

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EXPORTS of iron and steel wood screws during December, 1937 totaled 40,279 gross valued at $5,-690. Of this total Cuba took 15,-682 gross valued at $1,766; Mexico 6,916 gross valued at $880; Brazil 3,393 gross valued at $639; Philippine Islands 2,550 gross valued at $292; Union of South Africa 2,100 gross valued at $251; Panama, 1,-762, valued at $312.

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EXPORTS of brass wood screws during the same month totaled 6,701 gross valued at $2,884. Of this total Canada took 2,019 gross valued at $640; Brazil 1,489 gross valued at $776; Cuba 689 gross valued at $458; Argentina 687 gross valued at $196; Panama 550 gross valued at $167.

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IMPORTS of wood screws during the same month totaled 18,-632 gross valued at $6,602. Of this total Japan supplied 11,133 gross valued at $707; Germany 2,-150 gross valued at $5,511; Belgium 5,000 gross valued at $361; Sweden 349 gross valued at $23.

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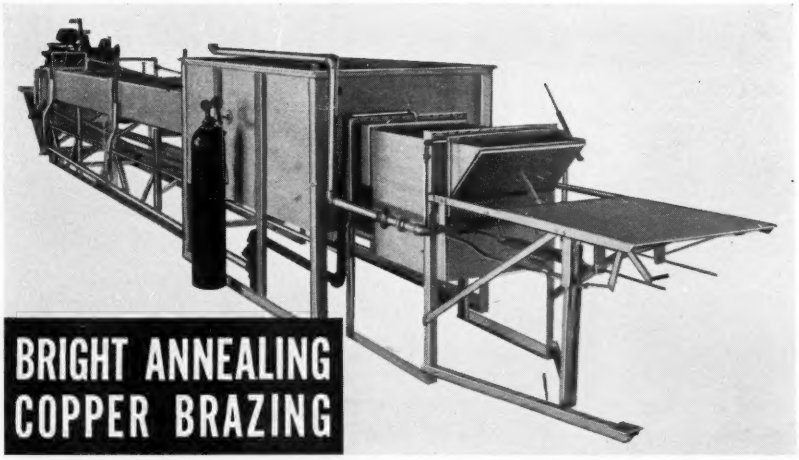
Union Wire Rope "Talking Movie" Depicts "Romance of Wire Rope"

EVERY once in a while there is seen some outstanding bit of advertising. Sometimes it is pictorial, sometimes statistical, sometimes technical, and sometimes constructively educational.

✦ ✦ ✦

IN the last-named class is the new talking moving picture depicting in detail the complete processes of drawing High Carbon Rope Wire and fabricating Wire Rope, as produced by the Union Wire Rope Corporation, of Kansas City, Missouri. This interesting and instructive picture is designed for presentation before groups in the building and construction, mining, logging, oil and other industries in which wire rope is extensively used.



Send for Bulletins:
Bright Annealing
Copper Brazing
Tool Hardening

Hayes Electric Furnaces are made in a variety of sizes; hand fed and conveyor; dry or quench cooled.

Complete protection of surface is assured by the patented Certain Curtain control of atmosphere, which has proved so successful in Hayes furnaces for hardening high speed and alloy steels.

Certain Curtain

C. I. HAYES, INC.
ESTABLISHED 1905
129 BAKER ST., PROVIDENCE, R. I.

SETS THE STANDARD FOR PRECISION ATMOSPHERE CONTROL

'Round the World With the Wire Industry

German Notes

STANDARDIZATION of barbed wire is a custom in all markets. The multifold types, weights, etc. are disappearing and certain standards are taking their place. Some markets already buy only one type, one weight and one size. Instead of nearly a dozen different types, such as Waukegan, Glidden, Yowa, Domingo, Marcel, etc., only two are left, Yowa and Waukegan. The first one is the original barb wire and is the standard in almost all markets, with the exception of the West Indies, Central America and South America north of the Equator where Waukegan barbed wire is predominant. Instead of diameters of the double strands each between G 10 and 14, the 12 and 12½ (the latter for the Waukegan) dominate the markets, other diameters are disappearing. Instead of distances varying between 2″ and 4″ between the 4 points (only 4 points and not 2 are ordered nowadays), the 3″ space barbed wire is the standard product, all other types have more or less disappeared.

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German Wire Reel Standardization

WOODEN reels are disappearing as the wire-hoop reel is quickly developing to be the only standard reel for barbed wire. Although the question of weight is still unsettled (the great difference varying between 22 lbs. (in Egypt and 133⅓ lbs. (picul in China) with various weights between), we find a concentration now on less diversified weights, the 100 lb. reel probably being the future standard weight for Continental Europe and the British Empire markets where the 1 cwt. (112 lbs. reel) was formerly predominant.

HOT spelter galvanized barbed wire now dominates the market leaving the real galvanized barbed wire behind. Barbed wire is thus developing into a world standardized product, which is to the benefit of both consumers and manufacturers. Previously a reel of 100 lbs. Waukegan 12½, 3″ spaced barbed wire was unsaleable when it had been sent to a market where Glidden 11 G, 4″ spaced, 1 cwt. reel barbed wire was the standard market product. In today's markets there is no difference which should materially affect the price or acceptance of either wire as shipped.

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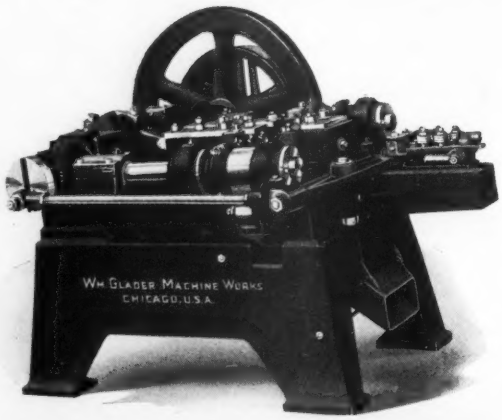
German Exports

NO change of any importance can be reported on the export markets. The prices are practically unaltered. The only exception is barbed wire on which prices are lower. Reports of a keen competi-

HIGH SPEED WIRE NAIL MACHINE



WM. GLADER MACHINE WORKS

210 N. Racine Ave., Chicago, Illinois

Glader Machines on large-head single blow and twin-head work can be seen in operation at the Pittsburgh Steel Company Plant at Monessen, Pa.

The production figures on common nails shown below, are guaranteed.

SIZE MACH.	SIZE WIRE	MAX. LENGTH OF NAIL	NUMBER OF NAILS PER MIN.	CAP. IN POUNDS PER HR.
#00	#14	1¼″	550	55
#0	#12	1¾″	450	89
#1	#10	2½″	400	192
#2	#8	3½″	325	310
#3	#4	5″	225	523
#4	#1	7″	190	622
#4s	5/16″	9″	175	1155
#5	⅜″	12″	160	2400

This high output and economical operation account for the GLADER machine being accepted as standard equipment in all recent installations.

tion with the American industry have not been confirmed. On the contrary, the agreement between the IWECO and the leading American wire exporting companies in the Brazilian market has been extended to Argentina and Uruguay. It is probable that this will be the case in other markets.

✦ ✦ ✦

German Rod Production

THE official price of £ (gold) 6.15.0 for wire rods is still maintained. German production rose to 127,000 tons in December —a new high which is approximately 21,000 tons more than last year. Only 6 to 7% of the German wire rod production is exported, whereas nearly 40% of the wire and wire nail output is sold for export. The wire rod cartel has to face growing outside competition. In many cases wire rods were sold at £1.0 below the official price. The extras for o.h. steel wire rods, which in the summer of 1937 were raised to 12/6 shillings per ton, were reduced to 8 to 9 shillings per ton. The European export business is still comparatively satisfactory.

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PWA Steel Orders Total $465,552,370 in 4 Years

A REPORT from the Bureau of Labor Statistics of the Department of Labor has just disclosed that a breakdown of material orders originating with PWA projects showed that iron and steel products to the extent of $465,552,370 were purchased from industrial concerns for these projects during the four years between June 1933 and June 1937. By far the largest item of iron and steel purchased for such projects was structural and reinforcing steel, the total purchases for these commodities amounting to $172,096,054.

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Carboloy Co. Inc., Plans To Build $750,000 Plant

THE Carboloy Company, Inc., has acquired a site in Hoover Road, Mount Clemens, Mich., on which it is planned to build a factory, estimated to cost $750,000 or more, with machinery and equipment installations.

STEEL WIRE

By MAURICE BONZEL

A NEW BOOK ABOUT WIRE!

495 pages. 414 charts, photomicrographs and illustrations

Translated and Published by Kenneth B. Lewis, Consulting Engineer

Price $15.00

SEND ORDERS TO

WIRE and WIRE PRODUCTS

17 E. 42nd STREET, NEW YORK

THESE

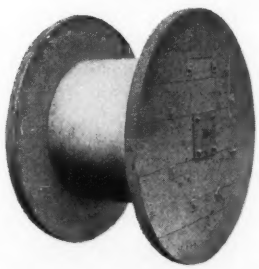
STEVENS FLANGED STEEL DRUMS

ARE USED BY MANY WIRE & CABLE MANUFACTURERS.

FOR

ALL I. P. C. E. A. AND SPECIAL SIZES AND CAPACITIES OF THIS TYPE SHIPPING REEL.

ASK A USER



WRITE FOR DETAILS

Made in Low Carbon Steel for Standard Weight and in High Carbon and Alloy Steels for Special Light Weight Drums.

Galvanized — Painted — Plain Finishes

STEVENS METAL PRODUCTS CO.

NILES, OHIO

A Review of Recent Wire Patents

No. 2,101,054, OPEN BOTTOM, FLOATING TOP SPRING CUSHION CHAIR OR THE LIKE, Patented December 7, 1937 by Robert E. Eaton, Burlington, Iowa, assignor to Chittenden & Eastman Company, Burlington, Iowa, a corporation.

Relating to a spring structure for chairs, davenports, etc., the chief object is to provide a construction which will permit the top of the cushion structure to flex as desired, the coil spring cushion unit being readily secured at its lower portion to a framework and its intermediate portion being so retained by the framework as to allow the top to float.

✦ ✦ ✦

No. 2,101,124, SPRING STRUCTURE, Patented December 7, 1937 by Leonard A. Young, Detroit, Michigan.

To provide a spring structure of the automobile or chair seat type in which the upholstery may be quickly attached and renewed, there is provided a spring supporting base including a border frame, and pocketed springs secured to the base by clips, the upholstery being provided with a spring-enclosing skirt which is drawn around and lapped upon the under side of the border frame.

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No. 2,101,195. METHOD OF MANUFACTURING PAPER CLIPS. Patented December 7, 1937 by Howard D. Randall, Cincinnati, Ohio.

Complete Descriptions and Drawings of Patents May Be Had for 25 cents. Address, Wire & Wire Products, 17 East 42nd St., New York.

In producing the paper clip of this invention, a resilient wire is bent into spiral formation and then placed between pressing die elements which flatten the wire and effect a change in the molecular structure thereof so as to render the clip more resilient and effective, the finished product being a thin spiral ribbon having its convolutions in a common plane.

✦ ✦ ✦

No. 2,101,382, SAFETY DEVICE FOR COILING MACHINES, Patented December 7, 1937 by John F. Donovan and George Illingworth, East Cleveland, Ohio, assignors to General Electric Company, a corporation of New York.

To provide a particularly sensitive device for detecting the coiling operation of apparatus for coiling very fine wire, such as that used for electric lamp filaments, the structure includes two members engaging opposite sides of the wire coil and which move closer together when the coil no longer passes therebetween, a system of levers multiplying the movement of the members sufficiently to bring together a pair of electric contacts forming part of an alarm and motor shut-off circuit.

No. 2,101,386, SUBMARINE SIGNALING CABLE, Patented December 7, 1937 by Julius Engler and Ernst Studt, Nordenham, Germany, assignors to Norddeutsche Seekabelwerke A. G., Nordenham, Germany.

This submarine signaling cable is insulated next to the conductors with a layer of liquid insulating material with low dielectric losses and low dielectric constant, such as hydrocautchoruc, over which is placed a covering of insulating thermoplastic material impermeable to water, the covering being held away from the conductors by a spiral distancing member of polystyrol.

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No. 2,101,553, COATING IRON OR STEEL WITH ALUMINUM OR AN ALLOY THEREOF, Patented December 7, 1937 by Ernst Johan Mauritz Mattsson, Stockholm, Sweden, assignor to Frans Nilsson, Stockholm, Sweden.

In aluminizing surfaces of a ferrous metal body, the same is cleaned and heated by immersion in a molten flux bath of the salt type containing sodium aluminum fluoride, sodium chloride, potassium chloride, and zinc chloride free from calcium salt, after which the body is immersed in molten aluminum.

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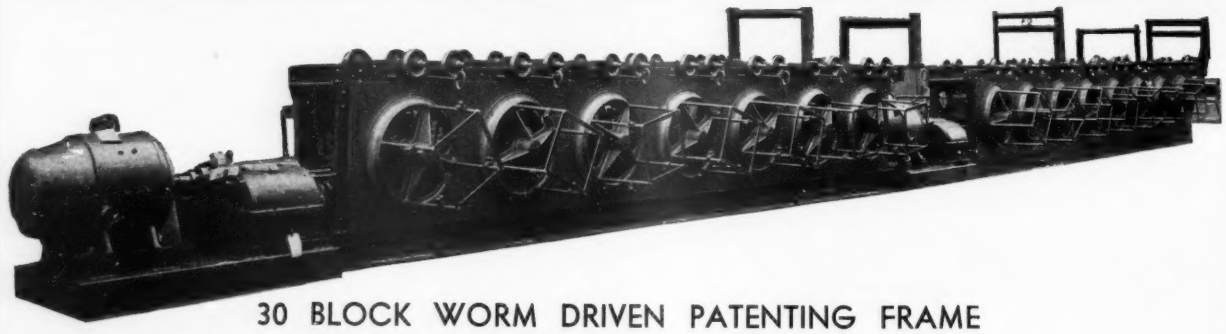
No. 2,101,580. PROCESS FOR OBTAINING BRIGHT ZINC COATING, Patented December 7, 1937 by John A.



30 BLOCK WORM DRIVEN PATENTING FRAME

In use in Pittsburgh Steel Patenting Department for rods and wire.

This outfit consists of two frames, each driven by a 20 H. P., D. C., 4 to 1 motor, through a two speed Heli-Spur Gear Reduction Unit, giving a range of speed to blocks of 3/4 to 10 R. P. M.

This range of speed allows for Patenting of Rods or Wire.

Each pair of blocks, which are 30" diameter, has its own individual self contained worm unit connected to the next one by flexible couplings.

Frame runs quiet, maintenance is low, and pull is uniform.

BRODEN CONSTRUCTION CO.

ENGINEERS - - BUILDERS

Wire Mill and Cold Rolling Equipment

11730 Harvard Avenue CLEVELAND

A Review of Recent Wire Patents

Hendricks, Chicago, Ill., assignor to Udylite Company, Detroit, Mich., a corporation of Indiana.

In the electrodeposition of zinc, bright coatings may be had by employment of a cyanide plating solution containing an ammonium thiocyanate formaldehyde resin. In making a new zinc plating solution, the resin, zinc salt, caustic soda, and sodium cyanide are mixed and dissolved in water.

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No. 2,101,581, PROCESS FOR OBTAINING BRIGHT ZINC COATING, Patented December 7, 1937 by John A. Hendricks, Chicago, Ill., assignor to Udylite Company, Detroit, Mich., a corporation of Indiana.

In the electrodeposition of zinc, bright coatings may be had by employment of a cyanide plating solution containing a thiourea formaldehyde resin. A mixture of the resin, zinc oxide, sodium cyanide and caustic soda is used for preparing the bath.

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No. 2,101,630, MACHINE FOR PRODUCING ROPES FROM STEEL WIRES, Patented December 7, 1937 by Julius Rath, Lippstadt, Germany.

In order to produce a rope from steel wires wherein the individual wires are uniformly loaded when the rope is stressed, the machine is provided with a straightening device for each wire between its reel and the laying die, and each straightening device is rotatable about its wire as an axis and driven in the same direction and at the same speed as the reels.

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No. 2,101,860, WIRE CUTTING MACHINE, Patented December 14, 1937 by Marvin W. Lewis, Cleveland Heights, and Carl B. Jones, East Cleveland, Ohio, assignors to The Lewis Machine Company, Cleveland, Ohio, a corporation of Ohio.

This machine will cut predetermined lengths of wire from a continuous straight wire without interrupting the feed of the wire or slowing down the wire during cutting. A gage is provided for coaction with a cutting head so as to rapidly gage and accurately cut predetermined lengths of wire.

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No. 2,101,959, METAL DRAWING APPARATUS, Patented December 14, 1937 by Walter F. Schulz, Youngstown, Ohio, assignor of one-half to Julius Kahn, Youngstown, Ohio.

Wire drawing is effected through a series of radially disposed rolls in groups having three or more sets of rolls, the axes of the rolls of each group coinciding in a single plane, the radial line of roll group positions being staggered to an intermediate overlapping relation to effect close spacing and allow better work distribution.

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No. 2,101,982, MACHINE AND METHOD FOR FORMING HELICAL SPRINGS, Patented December 14, 1937 by Raymond F. Carlberg, Grand Rapids, Mich.

This invention provides a continuously operating machine and method for forming helical springs with attaching ends, the machine bending over, from parallelism with a fed helical work piece, portions thereof to form attaching ends and severing each finished spring from the helical work piece.

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No. 2,102,059, DEVICE FOR APPLYING COATINGS TO WIRES, Patented December 14, 1937 by Wilber H. Convers, Poughkeepsie, N. Y., assignor to James K. Delano, Rye, N. Y.

In applying an insulative coating to wire, separate compartments are provided each with a roller over which the wire is passed. The first compartment contains the coating material to a high level and the roller thereof applies the material to the wire. In succeeding compartments, the coating material is maintained at a lower level and the rollers thereof are provided with scrapers for removing excess material.

✦ ✦ ✦

No. 2,103,841, METHOD OF INSULATING CONDUCTORS, Patented December 28, 1937 by John F. Calvert, Ames, Iowa, assignor to Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., a corporation of Pennsylvania.

The conductor is covered with a layer of self-polymerizing material containing an inhibitor, and a second layer of self-polymerizing material containing a catalyst, after which sufficient heat is applied to harden the second layer without polymerizing the first layer, and then heat and pressure are applied to cause the first layer to harden, so as to prevent vaporization of the material of the first layer.

✦ ✦ ✦

No. 2,103,917, WIRE FABRIC AND METHOD OF MAKING THE SAME, Patented December 28, 1937 by Otto Carl Scherfel, Haddon Heights, N. J., assignor to Audubon Wire Cloth Corporation, Philadelphia, Pa., a corporation of New Jersey.

To form a belt structure of wire fabric, helically coiled wires are arranged in interlaced and interconnected relation transversely of the fabric and cross wires are associated with the interconnected bights of the coiled wires for reinforcing the fabric.

✦ ✦ ✦

No. 2,103,918, WIRE FABRIC AND METHOD OF MAKING THE SAME, Patented December 28, 1937 by Raymond J. Guba, Philadelphia, Pa., assignor to Audubon Wire Cloth Corporation, Philadelphia, Pa., a corporation of New Jersey.

This flexible high-tensile strength belt fabric has interstices of small dimensions and includes helically coiled wires arranged in pairs and interlaced with the wires of other pairs, and in the bights of the several pairs of coiled wires, cross wires are passed, which lie wholly within the fabric.

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No. 2,103,919, WIRE FABRIC AND METHOD OF MAKING THE SAME, Patented December 28, 1937 by Raymond J. Guba, Philadelphia, Pa., assignor to Audubon Wire Cloth Corporation, Philadelphia, Pa., a corporation of N. J.

Sets of helically coiled wires of alternate right and left hand twist are disposed in interrelated arrangement and sets of crimped cross connector wires are independently associated with the respective sets of helically coiled wires to form a belt fabric.

✦ ✦ ✦

No. 2,103,920, CONVEYOR BELT, Patented December 28, 1937 by Raymond J. Guba, Philadelphia, Pa., assignor to Audubon Wire Cloth Corporation, Philadelphia, Pa., a corporation of New Jersey.

Connecting and spacing a plurality of parallel drive chains are cross-bars which support a continuous fabric with flanged marginal edges made up of helically coiled transverselv-disposed inter-connected wires, the fabric being of the type disclosed in Patent No. 2,-103,917.

✦ ✦ ✦

No. 2.104,121, MANUFACTURE OF FLEXIBLE CONDUIT, Patented Jan. 4, 1938 by George A. Gleason, Worcester, Mass., assignor to The American Steel and Wire Company of New Jersey, a corporation of New Jersey.

A method of forming a flexible conduit of the type used to carry the operating cables of automobile brakes is described. A half-wound wire is coiled into a helix: a T-wire is wound over the helix so that its stem portion extends between the convolutions thereof; and then inwardly directed force is applied to the T-wire to thin its head portion and elongate its stem portion.

✦ ✦ ✦

No. 2.104,656, WIRE TENSION CONTROLLING DEVICE, Patented January 4, 1938 by Robert F. Krejci, Cleveland Heights, Ohio, assignor to General Electric Company, a corporation of New York.

Between the winding and unwinding spools, is a sheave engaging the wire and movable to take up any slack in the wire, this movement controlling the making and breaking of a circuit including a mercury switch. Clutches, for controlling the rate of rotation of the spools, are operated through the circuit, to maintain the correct tension on the wire.

✦ ✦ ✦

No. 2,104,713, METHOD OF MAKING A COILED METALLIC STRAND, Patented January 4, 1938 by John W. Gottschalk and Sylvester W. Grater, Philadelphia, Pa.; said Grater assignor to said Gottschalk, Annie Gottschalk administratrix of said John W. Gottschalk, deceased.

When the strand of this invention is formed into a flexible metallic bunch, the abradant surfaces will be increased. The strand is subjected to a coiling operation while under tension and also to a deforming operation which increases the abradant surfaces at the exposed edges, so that the strand will be rippled, crimped, corrugated or knurled.

(Please turn to Page 146)

A Review of Recent Wire Patents

(*Continued from Page 145*)

W. Gleason, Chicago, Ill., assignor to Nachman Spring-Filled Corporation, Chicago, Ili., a corporation of Illinois.

The structure consists of a series of zig-zag resilient wire units which constitute flat vertical spring elements for reinforcing the side edges of mattresses, etc., the opposite ends of each element terminating in horizontal upper and lower tongues provided with loops slidably engaging corresponding tongues of an adjacent unit.

✦ ✦ ✦

No. 2,102,129, ELECTRIC CABLE, Patented December 14, 1937 by Samuel J. Rosch, Yonkers, N. Y., assignor to Anaconda Wire & Cable Company, New York, N. Y., a corporation of Delaware.

Deterioration or impairment of the insulating oil of cables is prevented or minimized by the use of a quantity of carbon black in contact with and serving as a purifying agent for the oil. The carbon black preferably is placed in the layers of the wrapping adjacent the metal conductor and sheath.

✦ ✦ ✦

No. 2,102,287, WIRE LINE TWISTER, Patented December 14, 1937 by James A. Smethers, Andrews, Texas.

This invention relates to a wrench for gripping a cable or wire line in oil field work and which may be quickly caused to grasp, with great pressure, cables of varying sizes. Movable toward and away from the stationary jaw by means of a cam is an adjustable clamping jaw, provided with a spring for urging the jaws apart.

✦ ✦ ✦

No. 2,102,300, WIRE SEAM, Patented December 14, 1937 by Otto A. Abendroth, Appleton, Wis.

In producing a seam in wire fabric, the warp wires are trimmed close to the end weft wire of one edge of wire fabric, a solid fuse wire is substituted for the weft wire of another edge of wire fabric, and the warp wires trimmed close to the fuse wire. The edges are then brought together with the fuse wire in close relation to the end weft wire and heat is applied to melt the fuse wire.

✦ ✦ ✦

No. 2,102,337, APPARATUS FOR HANDLING COILS, Patented December 14, 1937 by George H. Rose, Cleveland, Ohio.

A device is provided for transferring bundles of coils from a horizontal conveyor to a hook conveyor, the coils on the horizontal conveyor being arranged for engagement by a double-ended hook which is adapted to be raised, lowered and rotated, so as to take a coil from the horizontal conveyor and position it for engagement by a traveling hook.

✦ ✦ ✦

No. 2,102,467, MANUFACTURE OF KEYS FOR PRESERVE CANS, Patented December 14, 1937 by Erik Ljungström, Stockholm, Sweden, assignor to Aktiebolaget Transitoria, Stockholm, Sweden. a corporation of Sweden.

An object of the invention is to provide a method for the manufacture of keys whereby the grip portion of the key blank is flattened and then cleft longitudinally to form two shanks which are bent outwardly in opposite directions. The machine for carrying out the method includes two blocks movable towards and away from each other and carrying the cleaving and bending means.

✦ ✦ ✦

No. 2,102,610, METHOD AND APPARATUS FOR UNWINDING WIRE, THREAD OR THE LIKE, Patented December 21, 1937 by Arthur Ernest Blashill, Withington, Manchester, England.

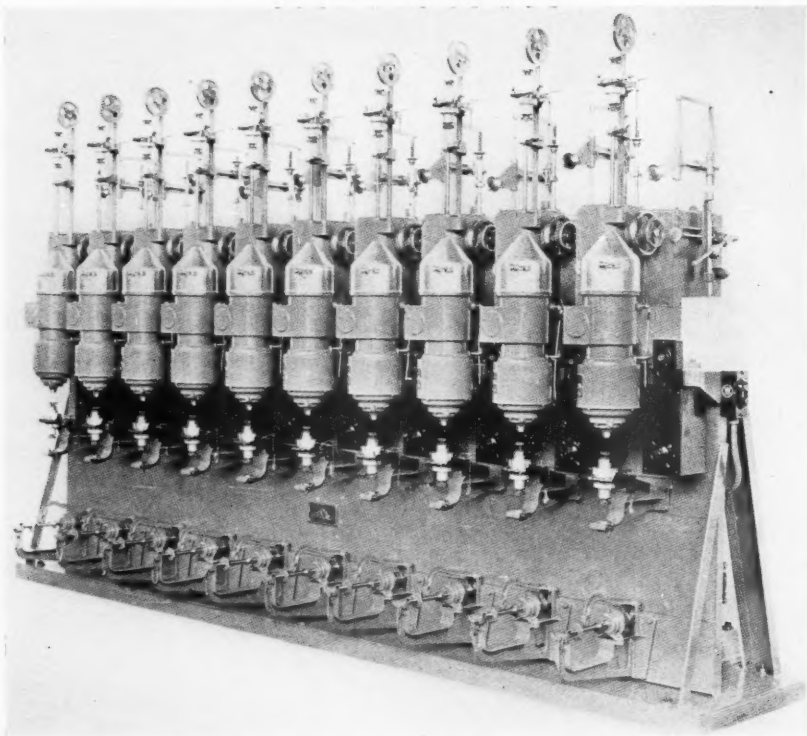
A continuous feed of wire from coils is effected by supporting a coil of wire upon a reel, unwinding the wire of the coil from the end of the reel remote to the end over which the coil was placed upon the reel and in a direction away from the latter end, and before completing this unwinding, uniting the free end of such coil to the wire of a second coil placed upon the reel and so on for any number of coils.

✦ ✦ ✦

No. 2,102,692, STRAND HANDLING APPARATUS, Patented December 21, 1937 by Erwin E. Franz, Cranford, N. J., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

This apparatus for winding a strand on a toroidal core in successive turns each passing through the central aperture of the core includes a rectilinear shuttle carried in a closed loop path through the aperture of the core and means to apply the strand carried by the shuttle in properly disposed relation about the core.

SYNCRO



SYNCRO Fine Wire Insulating Machines

Where Individuality Counts . . .

Each spindle is directly motor driven and entirely independent of each other and can be operated at flyer speeds of 3400, 5200 or 7000 R. P. M.

Serving tensions and lay are also obtainable for each spindle.

Take-up tensions and distributor lead to accommodate wire sizes within the range of the machine can be closely controlled on each individual unit.

SYNCRO MACHINE COMPANY

NEW YORK CHICAGO NEWARK

No. 2,102,724, SPRING CUSHION STRUCTURE, Patented December 21, 1937 by Walter Lesinski, Detroit, Mich., assignor to L. A. Young Spring and Wire Corporation, Detroit, Mich.

The border frame of this spring cushion structure is formed of longitudinally folded strips forming a double thickness horizontal web, the upper portion being reversely bent to form an inwardly facing spring supporting channel, and the lower portion being extended beyond the upper and curved downwardly and inwardly to provide an inwardly facing curved upholstery securing channel. Spot welded to the border frame is a spring supporting grid formed of longitudinal and transverse wires.

✦ ✦ ✦

No. 2,102,773, METHOD OF AND APPARATUS FOR HANDLING STRANDS, Patented December 21, 1937 by Leo L. Weaver, Cranford, N. J., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

In putting cover strands on cores, a serving or braiding machine in which the strand supplies may rotate does the serving at a point in the axis of revolution of the flier between the two parts thereof in such a way that the core strand enters the flier and the braid covered core leaves the flier devoid of rotation while rotating on itself at the point of serving.

✦ ✦ ✦

No. 2,102,974, ELECTRIC CABLE, Patented December 21, 1937 by Denis Morrell Robinson, London, England, assignor to Callender's Cable and Construction Company Limited, London, England, a British company.

An impregnated paper insulated cable devoid of gas spaces bounded by the surface of the conductor is formed with a conductor, the surface of which is made smooth and of non-reentrant configuration by building it, or the outer part of it, from wires of a section appropriate to give a continuous cylindrical form and covering with a thin contacting layer of homogeneous insulating material impervious to oil, the covering including at least one lapping of strip and over which is placed an impregnated paper insulation and a sheath.

✦ ✦ ✦

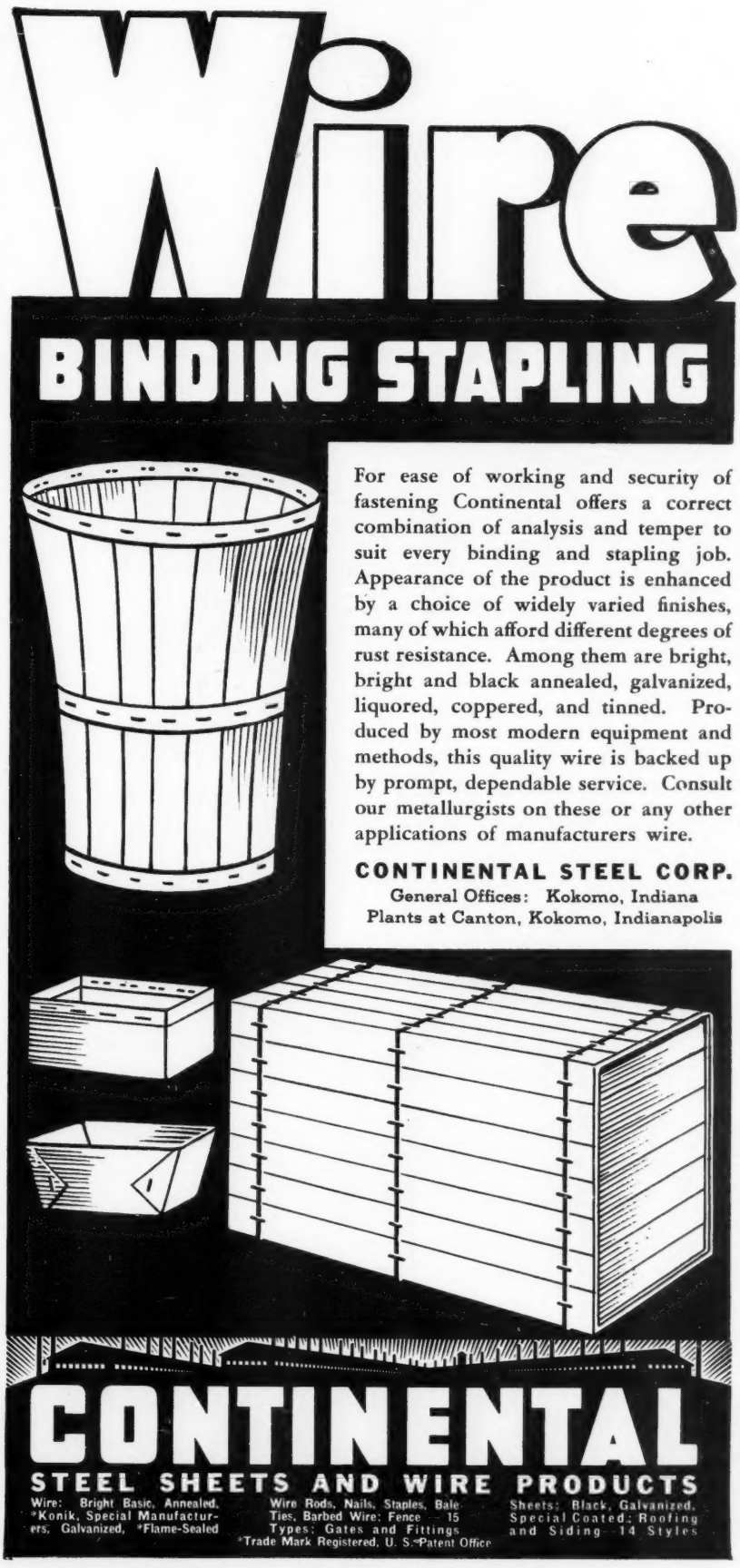
No. 2,103,134, APPARATUS FOR MANUFACTURING A COATED INSULATED WIRE, Patented December 21, 1937 by Takeo Akahira, Takinogawa-Ku, Tokyo, Japan, assignor to Zaidan Hojin Rikagaku Kenkyujo, Tokyo, Japan.

To the wire is successively applied one or more layers of insulative coating, the coated wire after drying being passed through a device for detecting bad insulation spots, and then through a spot coating device which is automatically controlled by the detecting device.

✦ ✦ ✦

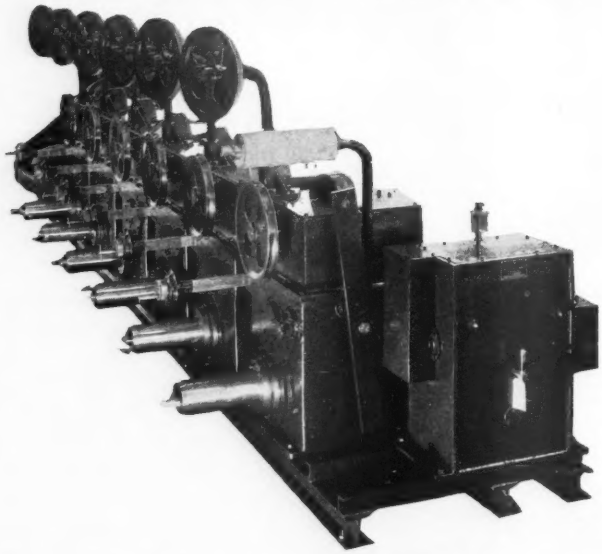
No. 2,103,422, FURNITURE, Patented December 28, 1937 by Harry E. Aulsbrook, Detroit, Michigan.

For securing double conical springs to metal straps extending across the frame, the inventor employs spring engaging ties of single or double Y-shaped formation which span the strip and engage the lower turns of the springs, the ties being secured to each other or to the straps.


Wire
BINDING STAPLING
For ease of working and security of fastening Continental offers a correct combination of analysis and temper to suit every binding and stapling job. Appearance of the product is enhanced by a choice of widely varied finishes, many of which afford different degrees of rust resistance. Among them are bright, bright and black annealed, galvanized, liquored, coppered, and tinned. Produced by most modern equipment and methods, this quality wire is backed up by prompt, dependable service. Consult our metallurgists on these or any other applications of manufacturers wire.
CONTINENTAL STEEL CORP.
General Offices: Kokomo, Indiana
Plants at Canton, Kokomo, Indianapolis
CONTINENTAL
STEEL SHEETS AND WIRE PRODUCTS
Wire: Bright Basic, Annealed, *Konik, Special Manufacturers, Galvanized, *Flame-Sealed
Wire Rods, Nails, Staples, Bale Ties, Barbed Wire: Fence 15 Types; Gates and Fittings
Sheets: Black, Galvanized, Special Coated; Roofing and Siding 14 Styles
*Trade Mark Registered, U. S. Patent Office

ES

SIX REEL TAKE-UP UNIT
FOR
TINNING PROCESS AND RE-SPOOLING



THE take-up unit shown is only one of the many we are in a position to supply for various wire processes.

ABOVE unit is made to receive six reels up to 24" maximum flange diameter - 500 lb. capacity.

KEEPS wire speed uniform throughout entire reel range by use of a capstan member.

EACH reel stand can be disconnected through individual starting and stopping clutches.

UNIVERSAL or individually adjustable distributing mechanism supplied to meet specific requirements.

PROVISIONS made for maximum wire speed to suit particular demands.

SPINDLES can be arranged for easy detachment to replace with arbors for use with shipping reels, etc.

▲▲▲

Complete Line of Equipment
For Producing Wire and Cable

ELEVATOR SUPPLIES COMPANY, Inc.
WIRE MACHINERY DIVISION
EXECUTIVE AND SALES OFFICE
420 LEXINGTON AVE., NEW YORK, N. Y.
WORKS
RAHWAY, N. J.
IN CANADA
CANADIAN ELEVATOR EQUIPMENT CO. LTD., TORONTO, ONT.

The Wire Association Pittsburgh Regional Meeting

IN connection with the Pittsburgh Regional Meeting to be held Friday, April 1, 1938, the Wire Association has sent out the following letter to all members:

Dear Sir:

You will find enclosed two invitations to attend the Pittsburgh regional meeting of the Wire Association. If you desire additional invitations for friends, they will be furnished upon request.

In connection with the meeting, it is planned to meet at the William Penn Hotel, Pittsburgh, Pa., at 10 A. M., on April 1st. From there the plant inspection of the Monessen wire mill of the Pittsburgh Steel Company will be made and sufficient cars will be supplied to take care of all desiring to make the trip.

It is anticipated that we will be able to cover a considerable part of the mill prior to the buffet luncheon which will be served by the Pittsburgh Steel Company, and finish up after luncheon, returning to Pittsburgh by at least 5:30 or 6:00 o'clock in the evening.

Those who are interested in seeing the tube mills at Allenport may do so if they will advise of their desire on arrival.

Dinner will be at 7:00 in the evening at the William Penn Hotel and immediately following, papers will be presented by Dr. S. A. Braley of the Mellon Institute of Industrial Research on a topic to be announced at the meeting, and by Mr. B. L. McCarthy, chief metallurgist, Wickwire Spenced Steel Co. Buffalo, N. Y., on the subject of "Factors That Influence Uses of Metals".

✦ ✦ ✦

THE letter is self explanatory outlining the complete program for the meeting, and in this connection non-members of the Wire Association may obtain invitations to attend by addressing Richard E. Brown, Secretary, The Wire Association, 17 East 42nd Street, New York, N. Y.

✦ ✦ ✦

National Metal Congress And Exposition

THE National Metal Exposition recently sent out a notice to all previous exhibitors, advising that they have until Saturday, April 16th to indicate their preference for space for the 1938 National Metal Congress and Exposition which will be held this year in Detroit, Michigan, October 17 to 21st inclusive.

✦ ✦ ✦

AFTER April 16th, space will be assigned and an opportunity

to exhibit will be open to firms who have not participated in previous Metal Shows.

✦ ✦ ✦

IT is suggested that exhibitors go over the floor plan carefully and advise of their requirements immediately.

✦ ✦ ✦

Bolt Trade to Eliminate Approximately 35% in Number of Sizes for Stock

THROUGH the adoption of simplified practice recommendation R169-37, which became effective last November, the bolt and nut industry will effect a reduction of from 896 to 584 sizes of machine, carriage and lag bolts in stock production sizes. This should create a much simpler storage problem and material savings for all concerned as it means a reduction of approximately 35% on the number of sizes required for stock.

✦ ✦ ✦

THE adoption of the new standard assures information at all times as to sizes readily available, and should be of value in the preparation of specifications, plans, etc. Many infrequently used and slow moving sizes formerly carried in stock are eliminated and the avoidance of many changes in production will result from the general adoption of this standard.

✦ ✦ ✦

IN accordance with the usual practice in adopting standard practice recommendations it is necessary that all interested participate if the program is to be successful. In the event of any appreciable part of the industry not agreeing to the new standards, the industry as a whole will of course be prevented from securing the full measure of benefit. It is hoped that all bolt and nut manufacturers and large buyers of bolts and nuts of the types covered will cooperate in securing the adoption by the industry of the new simplified practice recommendation.

We really try to "go to town" in this matter of uniformity. We know how important it is to *you* to have wire always the same in analysis, size, finish and working qualities. So we employ every conceivable check to maintain precise uniformity in every coil, every shipment. That's true, whether you use a wire made to your own particular requirements, or wire we regularly stock. Write—maybe Keystone wire will help your production run to a sweeter tune.

KEYSTONE

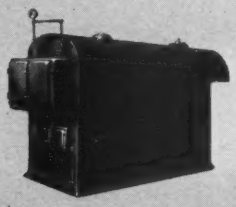
STEEL & WIRE CO., Dept. W, PEORIA, ILL.

HIGH CARBON
or
LOW CARBON

SAMSON
REG. U.S. PAT. OFF.
SPRING
WIRE
KEYSTONE STEEL & WIRE CO. PEORIA, ILL.

Bright . . . Tinned
Coppered
Annealed
Galvanized

THE EXTRA EQUIPMENT YOU'VE BEEN NEEDING

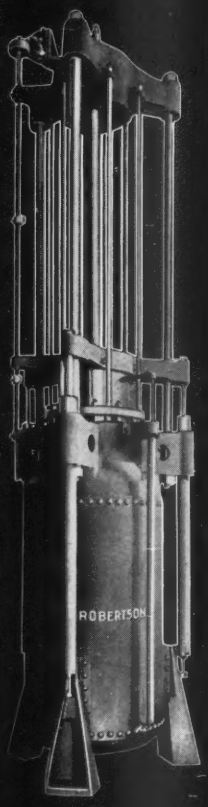


You can buy it with the savings!

THIS ROBERTSON ACCUMULATOR SAVES—

on maintenance costs, holds them to an absolute minimum. Releases for investment, in equipment of any kind, money formerly absorbed by upkeep on out-moded, big, cumbersome and undependable accumulators.

Utilizing its air tank as a base, it requires no special heavy foundation. Equipped with an automatic auxiliary air compressor which maintains pressure in cylinder and storage tanks . . . operates on but 175 lbs. air pressure. Details on request.



ROBERTSON HYDRO-PNEUMATIC ACCUMULATOR

JOHN ROBERTSON COMPANY, INC.

125-137 Water Street, Brooklyn, N.Y.

Outstanding Personalities of the Wire Industry

(*Continued from Page 139*)

named assistant manager of sales of the wire division with headquarters in Birmingham. He will direct Republic sales activity in wire and wire product markets throughout the south, serving the trade to which products of the Gadsden wire mills have in the past been distributed.

✦ ✦ ✦

J. R. Fraine has been appointed assistant manager of sales of the wire division for the northern territory, with headquarters in Chicago.

✦ ✦ ✦

MR. Brown, a native of Atlanta, Ga., joined the sales depart-

CARL C. BROWN,
Birmingham District Sales Manager, Republic Steel Corp.

ment of Gulf States Steel at Birmingham as chief clerk in 1910, following employment in the traffic department of the Nashville, Chattanooga & St. Louis Railroad and five years in traffic and sales departments of the Atlantic Steel Company at Atlanta. He was general sales manager of Gulf from 1918 to 1922, and returned to this position in 1925 after three years as vice president and general sales manager of Nichols Wire Sheet & Hardware Company at Kansas City.

✦ ✦ ✦

MR. Fraine was born in St. Paul and was attending the University of North Dakota in 1916

when he enlisted for service on the Mexican Border. He served overseas as a lieutenant and captain of infantry and on his return from the war was for four years field secretary of the Northwestern Lumbermen's Association. Associated with the Red Top Steel Post Company from 1923 to 1928, he joined the Keystone Steel and Iron Company, which he represented in Minneapolis and Peoria until September 1935 when he joined the Chicago district sales organization of Republic Steel. Since May 1936 he has been a member of the wire division sales organization.

✦ ✦ ✦

WITH assignment of general wire sales responsibilities to Mr. Brown, R. J. Working, district

J. R. FRAINE.
Assistant Manager of Wire Sales, Republic Steel Corp., Chicago.

sales manager of Republic at Birmingham prior to the Gulf States merger, resumes the district managership with the increased duties entailed by business acquired through the merger.

✦ ✦ ✦

National Screw & Mfg. Co.

TWO officials of the National Screw & Mfg. Co., Cleveland, retired in February. C. H. Palmer, first vice president and general sales manager, came with the company in 1898 and has been active in its development and progress for forty years. He has

(*Please turn to Page 152*)

Bell-Mine
Pulverized Lime

FOR WIRE DRAWING

Warner Company — Lime — Bell Mine Products — Bellefonte Division

"Bell-Mine" Lime is free from grit
and other impurities
..... has a high guaranteed
content of Calcium
.... is unusually slow settling
in the milk of Lime Box
.. is truly economic in use.

Warner Company
BELLEFONTE DIVISION
SALES OFFICES: PITTSBURGH, PHILADELPHIA, BELLEFONTE, N. Y. CITY.

PRINTED IDENTIFICATION
MARKER TAPE

Made of
Cellophane
TRADE MARK

FREYDBERG BROS., Inc.
STAMFORD, CONN.

WHOEVER UNDERSTANDS GERMAN
Should Read
"Draht-Welt" (Wire World)
A weekly for the wire industry and related lines.
Subscription price: Rm. 6.50 quarterly
Sample copies free on request from:
Martin Boerner — Verlag — Halle Saale, Germany

About Pickling Solutions—

Would you like to know:

What size Duriron Steam Jets, it takes to heat any given volume, at steam pressures up to 85 lbs./sq./in., —and probable steam consumption?

Just run your finger along the chart on Steam Jets in the new Duriron Bulletin No. 1801-A—and there you are!

Besides data on Steam Jets, steam consumption, etc., it has information on Duriron Ejectors, Tank Outlets, and Spray Nozzles.

(You use Duriron Ejectors to empty your lined tanks when you don't want to cut through for a bottom outlet).

This bulletin — fresh off the press — is yours for the asking. We have a copy to mail to you the same day we get your request.

THE DURIRON COMPANY, Inc.

445 N. Findlay Street Dayton, Ohio

Outstanding Personalities of the Wire Industry

(*Continued from Page 151*)

been sales manager since 1911 and a vice president since 1930. Howard T. Beidler, retiring secretary, has been with the company 49 years.

✦ ✦ ✦

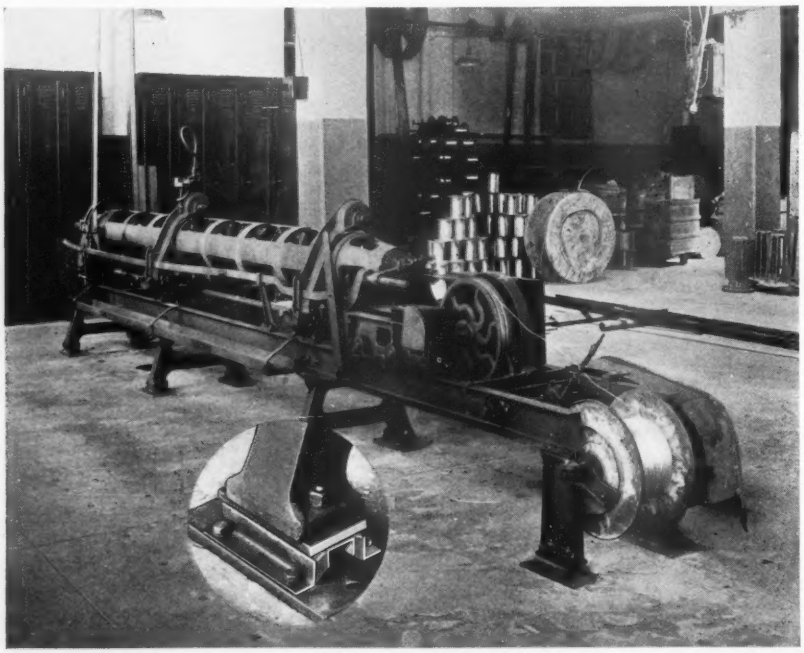
SUCCEEDING Mr. Beidler as secretary, President H. G. Alexander announces the appointment of E. E. Griese, treasurer, who now becomes secretary-treasurer. C. F. Newpher, formerly assistant to the president, now becomes vice president and general sales manager. Mr. Newpher came to the National Screw & Mfg. Co. early in 1937, from the Upson division of Republic Steel Corp., where he had been in charge of bolt and nut sales.

✦ ✦ ✦

WILLIAM C. Connelly, recently elected president of the Ohio Seamless Tube Co., Shelby, O., was elected a director.

Rubber Mountings Silence Noise and Vibration

UNTIL recently this high-speed strander was a constant source of noise and vibration. Today, it is one of the quietest-running machines in the plant of the Simplex Wire & Cable Company, Boston, Mass.



Rubber Mounted Strander operating at about 1500 r.p.m. without noise and vibration. ✦ ✦

THE transformation was accomplished through the use of standard type rubber mountings known as Vibro-Insulators. These mountings, which are made by The B. F. Goodrich Company, Akron, Ohio, are of the double shear rubber-to-metal type and are designed to support a load of 50 lbs. per inch. Since the strander weighed approximately 2500 lbs., it was necessary only to mount a Vibro-Insulator 6 inches long under each of the machine's eight legs. The job involved no engineering work and installation cost was exceedingly low as the unit's legs are attached directly to the top of the insulator which in turn is bolted to a metal plate secured to the floor.

✦ ✦ ✦

THE strander operates at about 1500 r. p. m. and the owner reports that all excessive noise and vibration have been eliminated with the installation of these rubber mountings.

MAKE YOUR PLANS NOW TO COME TO THE WIRE ASSOCIATION PITTSBURGH REGIONAL MEETING

Cylindrical Tanks, Covers and Outlets

BULLETIN B-1 issued by the Haveg Corporation, Newark, Delaware is noteworthy inasmuch as it gives complete technical data on standardized cylindrical tanks.

It should be of interest to every plant operating official where chemical corrosion enters into the manufacturing process. Copies can be obtained by addressing the Editor of "WIRE & WIRE PRODUCTS."

✦ ✦ ✦

New High-Speed Steel Treatment Announced

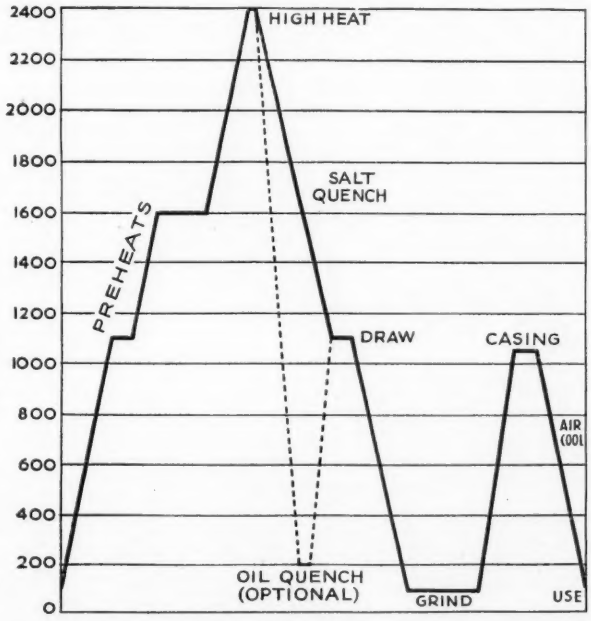
A COMPREHENSIVE cycle of high-speed steel treatment is announced by E. F. Houghton & Company, Philadelphia, in a bulletin describing new high-speed steel salts recently perfected by its research staff. Optional treatment, adapted to shop facilities and the number of pots economical to operate, is also set forth.

✦ ✦ ✦

TOGETHER with other salt bath products for liquor carburizing, reheating, neutral hardening, tempering, and blackening, the new high-speed steel salts formed an important feature of the liquid bath displays at the National Metal Exposition in Atlantic City.

✦ ✦ ✦

THE cycle of treatment is shown in the diagram at the right, the products used being branded "Liquid Heat." For the preheat, a neutral hardening salt, which will neither carburize nor decarburize, is provided. Liquid Heat No. 2400 with a working range of 2500° F. is recommended as a high-heat salt. Work may be quenched in oil or given a salt bath quench following the quick high-heat treatment.



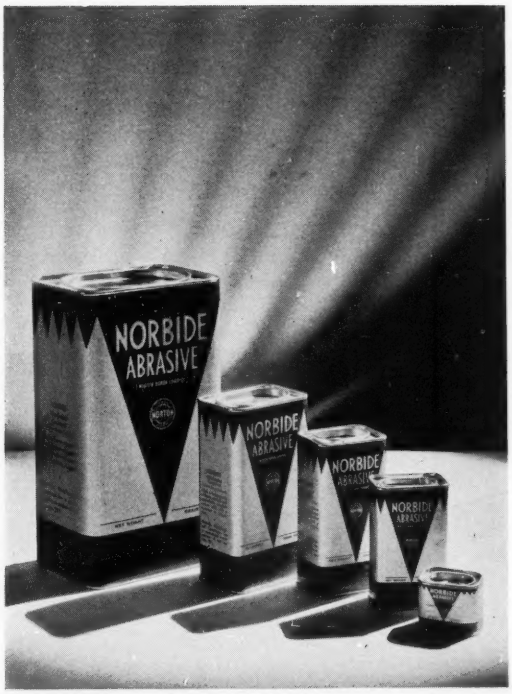
Cycle of treatment of high speed steel as developed by E. F. Houghton Company, Philadelphia, Pa.

✦ ✦ ✦

AFTER being drawn, the work is ground and a case is superimposed upon it by a further liquid bath, recently perfected, giving an outer case .001" to .002" in depth. This additional treatment adds a hardness of more than 1,000 Brinnell, and increases production of high-speed tools from 25 to 300% according to users.

✦ ✦ ✦

THE new salts and the high-speed steel treatment are described in a bulletin "Liquid Salt Baths," which will be sent on request.



NORBIDE ABRASIVE

For Cemented Carbide Dies

Used in place of diamond dust it reduces the cost of shaping, ripping and finishing.

NORTON COMPANY
WORCESTER, MASS.

N—38

NORTON ABRASIVES

LEWIS

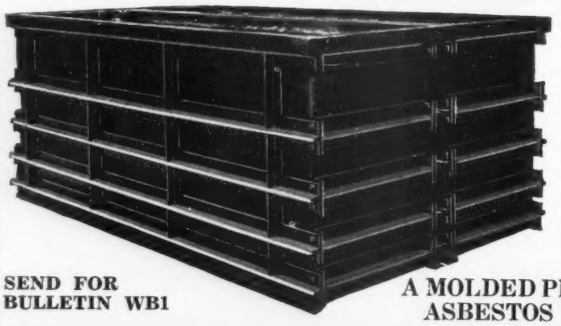
MODERN WIRE STRAIGHTENING AND CUTTING MACHINES

LEWIS MACHINES INCORPORATE THE LATEST PROVEN ENGINEERING DEVELOPMENTS IN THIS TYPE OF EQUIPMENT AND ARE BUILT TO GIVE YEARS OF UNINTERRUPTED SERVICE.

MACHINES TO HANDLE FROM 1/32" TO 3/4" ROD.
ROUND — SQUARE — FLAT — HEXAGON
FERROUS AND NON-FERROUS

THE LEWIS MACHINE COMPANY
3440 EAST 76 ST. — CLEVELAND, O.

HAVEG TANKS



THAT DO NOT LEAK — ARE UNAFFECTED BY PICKLING ACIDS, OR BY RAPID TEMPERATURE CHANGES. CAN BE USED UP TO 265° F.

SEND FOR BULLETIN WB1

A MOLDED PHENOLIC RESIN ASBESTOS COMPOSITION

HAVEG CORP., NEWARK, DEL.

HIGH ACCURACY IN WIRE RESISTANCE MEASUREMENTS

No. 4285
Portable Kelvin Bridge

This convenient, portable Kelvin Bridge is ideal for rapid, yet highly accurate, routine measurements of wire resistance. Its range is 0.0001 to 26.6 ohms. Limit of error is 0.25%, except at extreme low end of range (0.0001 to 0.0002 ohm) where it is 0.5%.

LEEDS & NORTHRUP COMPANY
4974 STENTON AVENUE PHILADELPHIA, PA.
LEEDS & NORTHRUP

J-EF22-53(1a)

STEELSKIN
REG. U. S. PAT. OFFICE
For High or Low Carbon Wire
WIRE DRAWING SOAPS
Established 30 years
R. H. MILLER CO., Inc. Homer, N. Y.

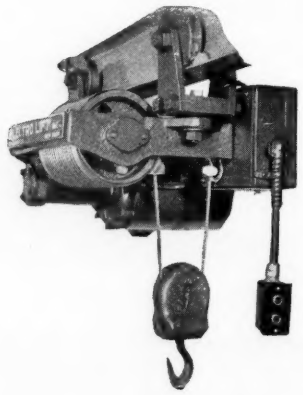
Electro Lift Rope Guide Hoist

THE new Rope Guide Hoist, built by ELECTRO LIFT, INC., No. 30 Church Street, New York City, shown in the picture below, has been designed especially for side and end pulling or wherever the loads cannot be brought directly under the hoist.

✦ ✦ ✦

THIS hoist has a drum with deep grooving allowing the cable to be completely submerged within the grooves. It is fitted with a traveling guide having a finger which runs in the groove ahead of the cable and which holds the cable in its proper groove.

✦ ✦ ✦



THE Rope Guide Hoist eliminates the hazard of crossed or piled up cables thus increasing the cable life and reducing cable breakage particularly where loads are pulled at an angle to the vertical.

✦ ✦ ✦

THIS hoist is built in sizes of ¼ to 5-tons, and has all the speeds and datings of standard ELECTRO LIFT Hoists. It has worm drive with worm and wheel running on Timken tapered roller bearings, fully enclosed within the gear case and running in a bath of oil. This provides simple construction and quiet operation. The motor has ball bearings and is directly attached to the hoist frame giving compact arrangement. The entire load is carried on a rigid cast steel frame. The hoist has close headroom allowing the hook to reach within a minimum distance of the overhead track. It has a safety hook block with a guard which completely encloses the bot-

tom sheave. It is built in both Single and Twin Hook types, the latter for handling long loads. The control may be either rope type or push button type, the latter giving accurate control of the load by jogging. Top and bottom limit switches may also be provided to stop the load in each direction of travel, preventing running the cable off the drum and providing an accurate stop at the bottom as well as at the top.

✦ ✦ ✦

Research on Fatigue Properties Of Heavy Helical Springs

(*Continued from Page 131*)

the graphs cross, the endurance for both steels at this stress being about 900000 cycles. In endurance limit the electric steel is somewhat superior, showing 75600 p. s. i. as compared with 73470 for the basic. However, the differences noted are probably little greater than the limits of reproducibility of the test results, and there is little to choose between the two steels.

✦ ✦ ✦

RESULTS of the tension and torsion tests were:

	Tension	Torsion
Proportional Limit —p. s. i.	115000	75000
Yield Strength —p. s. i.	129500	101500
Ultimate Strength —p. s. i.	200600	171380
Modulus —p. s. i.	30000000	10400000
Elongation—%	9.5	.....

The Final Installment of this Report Will be Published in the April issue of Wire and Wire Products.

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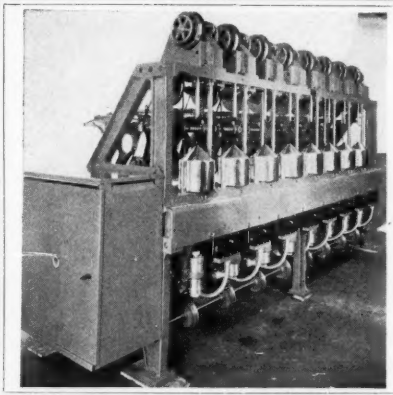

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Scale Model Rolling Mill Attracts Many

A SCALE model of a 72″ 4-high 3-strand cold reduction mill which actually rolls steel, and a scale model of a stamping press which stamps ash trays for presentation to visitors, are proving popular industrial exhibits of The Youngstown Sheet & Tube Company. Both of these units are actual reproductions of originals installed in the plants of the company. The models are constructed on a scale of 1½″ to the foot.

\+ + +

THE cold mill model rolls miniature coils of strip steel, reducing the thickness and adding to the length of the strip in exact imitation of the operation of the company's cold reduction mill. The steel is given one pass through the 3 strands of the model and then re-coiled. The coils are then placed on the model press, where the steel is stamped into ash trays of attractive designs.

\+ + +

THE models were first displayed as the main feature of The Youngstown Sheet & Tube Company's exhibit at the Informashow of the National Purchasing Agents' Association convention held at the William Penn Hotel in Pittsburgh, Pennsylvania, the latter part of May. This exhibit was awarded the first prize for the most informative display at this show. The models were constructed by the employees in their entirety of the pattern shop and tool room of No. 1 machine shop of the company, from plans prepared by and under the supervision of Myron S. Curtis, Sales Promotion Director.

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Rustless Stainless Steel Handbook

ATTENTION is called to a new handbook of Rustless Stainless Steels recently issued by the Rustless Iron and Steel Corporation of Baltimore, Md.

✦ ✦ ✦

THIS is a very handsomely illustrated description of stainless steel of various types, their characteristics, data on the range of tensile properties, physical characteristics, corrosion resistance and processing, together with descriptions of the individual characteristics of the various steels produced by this company, for fabricating or manufacturing purposes.

✦ ✦ ✦

THE engineering data contained in this book will be very useful to any one working in stainless steel and the general instructions for working Rustless stainless steels will be of particular interest to all production operating men.

✦ ✦ ✦

BECAUSE of the limited supply and the expense of the book, requests for copies can only be filled from companies whose letterheads indicate a commercial interest in the data contained therein.

✦ ✦ ✦

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Youngstown Sheet & Tube Co. ..... Inside Front Cover

WHERE TO BUY

For more complete information, consult the annual Directory, Index & Buyers' Guide.

ABRASIVES—
Norton Co., Worcester, Mass.

ANNEALING POTS AND BOXES—
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.

ANTI-RUST—
Magnus Chemical Co., Garwood, N. J.

ARMORING EQUIPMENT—
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Rahway, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

BAKERS—Rod and Wire
Morgan Construction Co., Worcester, Mass.
Morrison Engineering Co., Cleveland, O.

BORON CARBIDE—
Norton Co., Worcester, Mass.

CELLOPHANE—Tape
Freydberg Bros., Inc., Stamford, Conn.

CEMENT FLOOR CLEANER—
Magnus Chemical Co., Garwood, N. J.

CEMENTS—Refractory
Norton Co., Worcester, Mass.

CHEMICALS—Cleaning
American Chemical Paint Co., Ambler, Pa.
Magnus Chemical Co., Garwood, N. J.
Parkin, Wm. M., Co., The, Pittsburgh, Pa.

CLEANERS—Hand and Metal
Magnus Chemical Co., Garwood, N. J.

CLEANING & PICKLING EQUIPMENT—
Broden Construction Co., Cleveland, O.
Duriron Co., The, Dayton, O.
Haveg Corp., Newark, Del.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

COATING—Protective
American Lanolin Corp., Lawrence, Mass.

COILERS—Sheet, Strip and Wire
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
Torrington Mfg. Co., The, Torrington, Conn.

CONDUITS—Iron and Steel
Youngstown Sheet & Tube Co., Youngstown, Ohio.

CONTROLS—Automatic
Leeds & Northrup Co., Philadelphia, Pa.

CRANES—Wire Mill
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

DIAMOND TOOLS—
Rusch Wire Die Corp., New York, N. Y.

DIES—Diamond
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Cochaud Wire Die Co., New York, N. Y.
Driver Harris Co., Harrison, N. J.
Kelly Wire Die Corp., New York, N. Y.
Master Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Vianney Wire Die Works, New York, N. Y.

DIES—Lead Extrusion
John Robertson Co., Brooklyn, N. Y.

DIES—Repairs & Re-Cutting
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Cochaud Wire Die Corp., New York, N. Y.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Master Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Vianney Wire Die Works, New York, N. Y.

DIES—Rod and Tube Drawing
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Master Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Vianney Wire Die Works, New York, N. Y.

DIES—Tantalum Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Kelly Wire Die Corp., New York, N. Y.
Master Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Vianney Wire Die Works, New York, N. Y.

DIES—Tungsten Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Master Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Vianney Wire Die Works, New York, N. Y.

DIES—Wire Drawing
Carboloy Co., Inc., Detroit, Mich.

WHERE TO BUY, Continued

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H. J. Ruesch Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.

ENGINEERS—Consulting Wire Mill
Lewis, Kenneth B., New York, N. Y.

EQUIPMENT—Insulation Testing
Leeds & Northrup Co., Philadelphia, Pa.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FILLERS—Paper for Cable
E. W. Twitchell, Inc., Phila., Pa.

FURNACE CONTROLS — Combustion
Leeds & Northrup Co., Philadelphia, Pa.

FURNACE CONTROLS—Draft
Leeds & Northrup Co., Philadelphia. Pa.

FURNACES—Annealing
Electric Furnace Co., Salem, O.
Leeds & Northrup Co., Philadelphia, Pa.

FURNACES—Automatic
Electric Furnace Co., Salem, O.
Leeds & Northrup Co., Philadelphia, Pa.

FURNACES—Bright Annealing
Electric Furnace Co., Salem, O.
Hayes, C. I., Inc., Providence, R. I.

FURNACES—Electric
Electric Furnace Co., Salem, O.
Hayes, C. I., Inc., Providence, R. I.

FURNACES—Hardening and Tempering
Electric Furnace Co., Salem, O.
Hayes, C. I., Inc., Providence, R. I.
Leeds & Northrup Co., Philadelphia, Pa.

FURNACES—Lead Melting
Electric Furnace Co., Salem, O.
John Robertson Co., Brooklyn, N. Y.

FURNACES—Non-Oxidizing
Electric Furnace Co., Salem, O.

FURNACES—Normalizing
Electric Furnace Co., Salem, O.
Leeds & Northrup Co., Philadelphia, Pa.

FURNACES—Wire, Strip & Sheet
Electric Furnace Co., Salem, O.

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Gray Chemical Co., Roulette, Pa.

GRINDERS—Roll
Norton Co., Worcester, Mass.

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American Chemical Paint Co., Ambler, Pa.
Parkin, Wm. M., Co., The, Pittsburgh, Pa.

INSTRUMENTS—Electrical
Leeds & Northrup Co., Philadelphia, Pa.

INSULATION — Cable or Cable Filler
E. W. Twitchell, Inc., Phila., Pa.

LATHES—Die Reaming
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

LIME—Pulverized
Warner Co., Bellefonte, Pa.

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Magnus Chemical Co., Garwood, N. J.

LUBRICANTS—Wire Drawing
Magnus Chemical Co., Garwood, N. J.
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Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

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Fidelity Machine Co., Philadelphia, Pa.
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MACHINERY—Brazing
Thomson-Judd Wire Machinery Co., Lynn, Mass.

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MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

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Amer. Insulating Mach'y Co., Phila., Pa.
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Fidelity Machine Co., Philadelphia, Pa.
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Torrington Mfg. Co., The, Torrington, Conn.
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Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

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Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.

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Elevator Supplies Co., Inc., Rahway, N. J.
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Morgan Construction Co., Worcester, Mass.
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Sleeper & Hartley, Inc., Worcester, Mass.
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Watson Machine Co., Paterson, N. J.

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Elevator Supplies Co., Inc., Rahway, N. J.
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Torrington Mfg. Co., The, Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Cutting
Broden Construction Co., Cleveland, O.
Hallden Machine Co., Thomaston, Conn.
Lewis Machine Co., The, Cleveland, O.
F. B. Shuster Co., New Haven, Conn.
W. A. Schuyler, New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Enameling
Amer. Insulating Mach'y Co., Phila., Pa.

MACHINERY—Extruding
John Robertson Co., Brooklyn, N. Y.
Royle, John & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Flat Wire
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Forming
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Galvanizing Wire
Broden Construction Co., Cleveland, O.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Gang Winders
H. J. Ruesch Machine Co., Newark, N. J.
Fidelity Machine Co., Philadelphia, Pa.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., Worcester, Mass.

MACHINERY—Insulating
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Rahway, N. J.
Fidelity Machine Co., Philadelphia, Pa.
Syncro Machine Co., Newark, N. J.
Watson Machine Co., Paterson, N. J.

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John Robertson Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
John Robertson Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Magnet Wire
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Rahway, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY — Measuring Wire & Cable
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MACHINERY—Nail and Tack
Glader, Wm., Machine Works Co., Chicago, Ill.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Panning
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Rahway, N. J.

MACHINERY—Pointing
Broden Construction Co., Cleveland, O.
Elevator Supplies Co., Inc., Rahway, N. J.
H. J. Ruesch Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Rod Mill
Broden Construction Co., Cleveland, O.
Farrel-Birmingham Co., Ansonia, Conn.
Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
W. A. Schuyler, New York, N. Y.

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Broden Construction Co., Cleveland, O.
Morgan Construction Co., Worcester Mass.
H. J. Ruesch Machine Co., Newark, N. J.
Torrington Mfg. Co., The, Torrington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

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Watson Machine Co., Paterson, N. J.

MACHINERY—Rubber Tubing and Straining
Royle, John, & Sons, Paterson, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Screw Wire
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Special
Amer. Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, O.
Elevator Supplies Co., Inc., Rahway, N. J.
H. J. Ruesch Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY— Special — Combination Machine for Drawing, Cutting-to-length. Straightening and Reeling Bars from Coil in One Operation (Shumag Type)—
W. A. Schuyler, New York, N. Y.

WHERE TO BUY, Continued

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Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Rahway, N. J.
Fidelity Machine Co., Philadelphia, Pa.
Sleeper & Hartley Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spring Making
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
Broden Construction Co., Cleveland, O.
Hallden Machine Co., Thomaston, Conn.
Lewis Machine Co., The, Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
W. A. Schuyler, New York, N. Y.
F. B. Shuster, New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Stranding
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Swaging
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Taping
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Rahway, N. J.
Fidelity Machine Co., Philadelphia, Pa.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Testing Size of Wire
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Tinsel Rolling Mills
Amer. Insulating Mach'y Co., Phila., Pa.

MACHINERY—Trolley Wire
Vaughn Machinery Co., Cuyahoga Fall, O.

MACHINERY—Tube Mill
H. J. Ruesch Machine Co., Newark, N. J.
Torrington Mfg. Co., The, Torrington, Conn.

MACHINERY—Welding Wire
F. B. Shuster Co., New Haven, Conn.
Thomson-Judd Wire Machinery Co., Lynn, Mass.

MACHINERY—Winding
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Rahway, N. J.
Fidelity Machine Co., Philadelphia, Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Drawing
Amer. Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, O.
Elevator Supplies Co., Inc., Rahway, N. J.
Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
W. A. Schuyler, New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Torrington Mfg. Co., The, Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Wire Rope
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Tinning
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Rahway, N. J.

MACHINERY—Wrapping Wire
Elevator Supplies Co., Inc., Rahway, N. J.
W. A. Schuyler, New York, N. Y.

MILLS—Tandem Rolling and Edging
Torrington Mfg. Co., Torrington, Conn.

NICKEL SILVER AND PHOSPHOR BRONZE—Rod, Wire and Strip
Hudson Wire Co., Ossining, N. Y.

PAPER—Insulating
E. W. Twitchell, Inc., Phila., Pa.

PATENT ATTORNEYS—
Lancaster, Allwine and Rommel, Washington, D. C.

PICKLING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Parkin, Wm. M., Co., The, Pittsburgh, Pa.

PIPING AND FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.

POTS—Lead Melting
Farrel-Birmingham Co., Ansonia, Conn.
John Robertson Co., Brooklyn, N. Y.

PRESSES—Hydraulic and Mechanical
Farrel-Birmingham Co., Ansonia, Conn.
John Robertson Co., Brooklyn, N. Y.

PRESSES—Lead
John Robertson Co., Brooklyn, N. Y.

PULLERS—Wire
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

PUMPS—Hydraulic
John Robertson Co., Brooklyn, N. Y.

PYROMETERS—
Leeds & Northrup Co., Philadelphia, Pa.

RECORDERS—
Leeds & Northrup Co., Philadelphia, Pa.

REEL AND TENSION STAND—
Fidelity Machine Co., Philadelphia, Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., The, Torrington, Conn.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS AND SPOOLS—Shipping and Shop
Stevens Metal Products Co., Niles, O.

REFRACTORIES—High Temperature
Norton Co., Worcester, Mass.

ROD BAKERS—
Morrison Engineering Co., Cleveland, O.

RODS—Wire—Non Ferrous
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.

RODS—Wire—Steel
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

RUST PROOF COMPOUND—
American Lanolin Co., Lawrence, Mass.

SHEET—Steel
Continental Steel Corp., Kokomo, Ind.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

SKIN PROTECTOR—
Magnus Chemical Co., Garwood, N. J.

SOAPS—Industrial and Wire Drawing
Magnus Chemical Co., Garwood, N. J.
R. H. Miller Co., Homer, N. Y.

STRIP—Brass, Zinc and Non Ferrous
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.

STRIP—Steel
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.

TANKS—Compound
Watson Machine Co,, Paterson, N. J.

TANKS—Pickling
Haveg Corp., Newark, Del.

TAPE—Cellophane Marker
Freydberg Bros., Inc., Stamford, Conn.

TREADS—Safety
Norton Co., Worcester, Mass.

TRUCKS
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Fall, O.

TUBE BENDERS AND FORMERS—
H. J. Ruesch Machine Co., Newark, N. J.

VALVES AND FITTINGS—Acid Proof
Duriron Co., The, Dayton, O.
Haveg Corp., Newark, Del.

VULCANIZERS—
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS—
Amer. Insulating Mach'y Co., Phila., Pa.

WIRE—Cold Heading
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

WIRE—Electric
Hudson Wire Co., Ossining, N. Y.

WIRE—Enameled For Coils
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Manufacturers
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

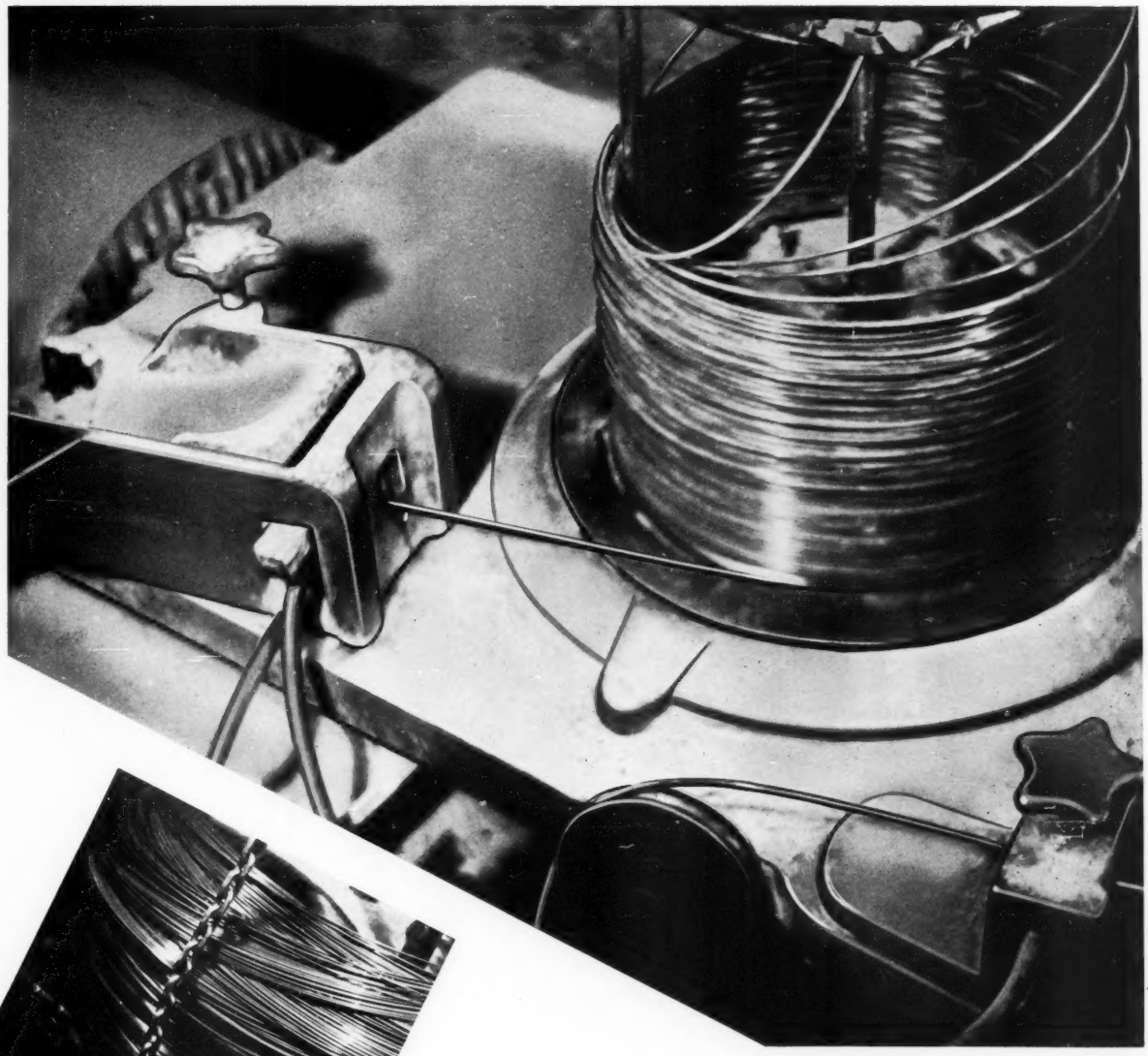
WIRE—Nickel Silver and Phosphor Bronze
Hudson Wire Co., Ossining, N. Y.

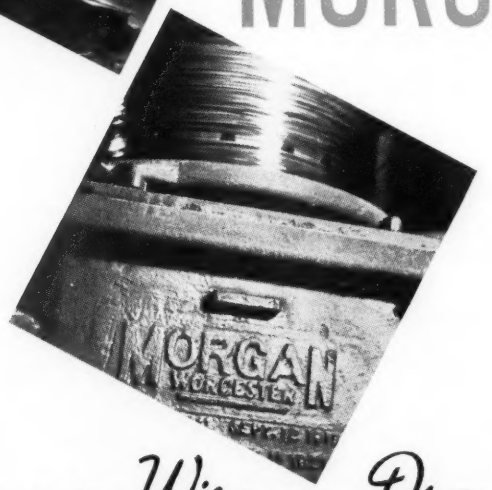
WIRE—Non Ferrous to Specification For Special Purposes
Hudson Wire Co., Ossining, N. Y.
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Spring
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

WIRE—Steel—Also Coppered Steel—Also Galvanized Steel
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

WIRE AND STRIP—Brass, Zinc
Platt Bros. & Co., The, Waterbury, Conn.





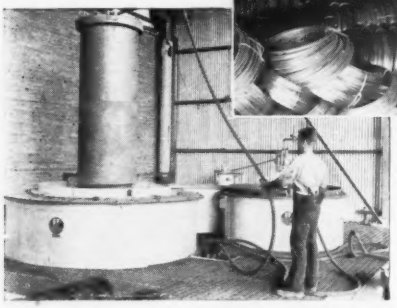
MORGAN-CONNOR

Morgan-Connor Wire Machines are produced by specialists who know wire drawing problems —and their answers. They offer you the exclusive high block design, air cooling of wire, and other outstanding developments. These features, plus sound design and rugged construction, assure the high drawing speeds and uniformly high quality needed to put modern production on a profit basis. Morgan Construction Co., Worcester, Mass., U. S. A.

Continuous Wire Drawing Machinery

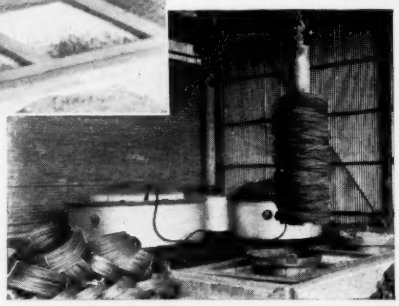
Sole European Representatives — Malmedie & Co., Dusseldorf, Germany

(Below) Moving a sealed pot of wire from the preheater to the furnace proper.



(Above) Showing charges in preheater, heating furnace and cooling chambers—The wire is in pots and is protected with Elfurno gas at all times—during heating and cooling. The Elfurno generator is shown in background.

(Below) Removing a spindle of annealed wire from a pot in one of the cooling chambers.



Furnaces For Bright Annealing Wire

Strip, Tubing, and Normalizing Rod

Another gas fired pit type furnace installation for bright annealing wire and normalizing and spheroidizing rod is shown above. This installation is also equipped with an Elfurno gas generator for controlling the surface conditions of both rod and wire.

Repeat orders from prominent wire plants substantiate our claims that "these pits turn out the most tonnage at the lowest cost with the most satisfactory surface condition obtainable and with the greatest flexibility of operation."

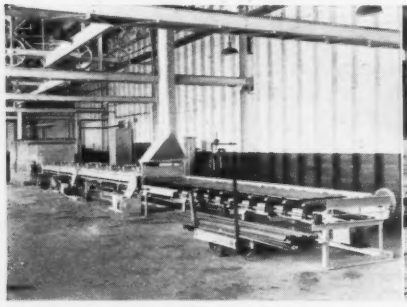
These furnaces are designed for firing with coke oven gas, mixed gases, natural gas or fuel oil and are furnished in single units or in batteries for any production.

Other outstanding installations we have made include furnaces for bright annealing copper wire, steel or copper tubing, strip, stampings, clean annealing brass wire, scale-free hardening bolts, springs and miscellaneous other products as well as furnaces for nitriding, carburizing, copper brazing, billet heating, heating for forging and other heating and heat treating processes.

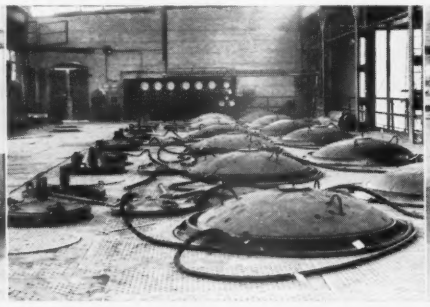
Write us regarding **your** furnace or heat treating problems.

The Electric Furnace Co., Salem, Ohio

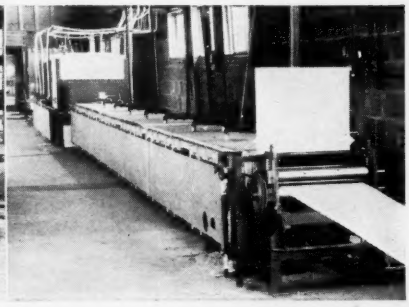
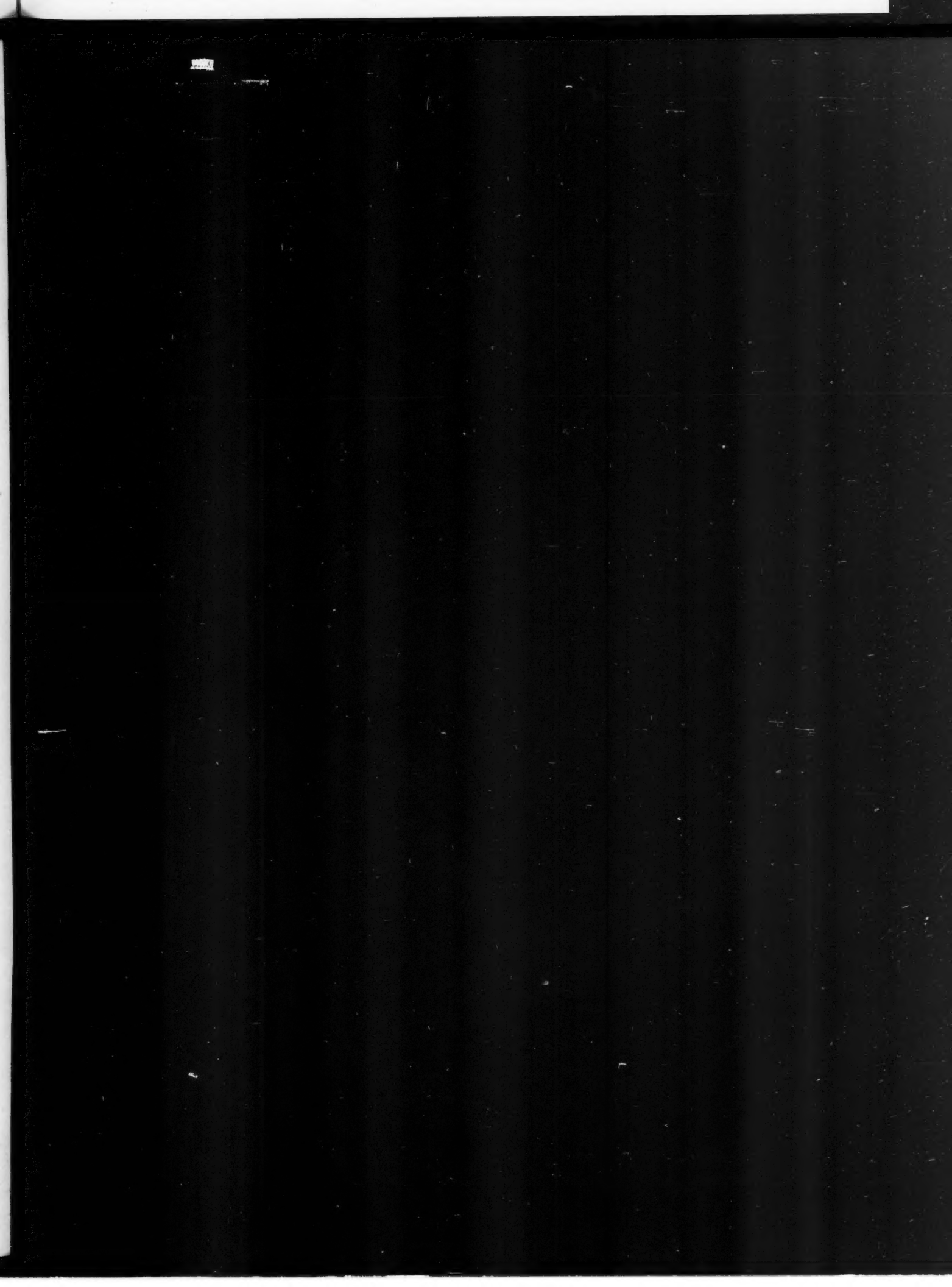
Gas Fired, Oil Fired and Electric Furnaces — For Any Process, Product or Production



BRIGHT ANNEALING STEEL TUBING. Various lengths and diameters are uniformly bright annealed and automatically unloaded onto trucks.



NORMALIZING AND SPHEROIDIZING ROD. Another "repeat order" controlled atmosphere installation—These pits also used for bright annealing wire.



BRIGHT ANNEALING STEEL STRIP. Continuous annealing advantages include quicker deliveries, shorter annealing time, absolute uniformity of finish and anneal.